A DISCOURSE OF Natural Bathes, AND Mineral Waters.

WHEREIN,

The Original of Fountains in general is declared. The nature and difference of Minerals, with Examples of particular Bathes. The Generation of Minerals in the Earth, from whence both the Actual Heat of Bathes, and their Virtues proceed. By what means Mineral Waters are to be discover'd. And lastly, of the Nature, and Uses of Bathes, but especially, of our Bathes at *Bathe*, in *Somerset-shire*.

By EDW. JORDEN, Doctor in Physick.

The Third Edition, revised and enlarged; with some Particulars of the Authors Life.

To which is added, An Appendix concerning *Bathe*, wherein the Antiquity, both of the Bathes and City, is more fully discover'd; with a Brief Account of the Nature, and the Virtues of the *Hot Waters* there.

By THOMAS GUIDOTT, *M. B.*

Imprinted at *London*, and are to be sold by *Thomas Salmon*, Bookseller in *Bathe*. 1669.

Imprimatur

Sam. Parker RR^mo Domino, ac D^no *Gilberto* Archi-Ep. *Cantuar.* a ſacris domeſticis.

Ex ædib. *Lambeth.*
Novemb. 7. 1668.

TO THE
Right Honourable,
FRANCIS Lord *COTTINGTON*,

Baron of *Hanworth*, Chancellour of the Exchequer, and one of his Majesties most Honourable Privy Council.

THE profitable use of Bathes, both for necessity and comfort, is such, and so well confirmed from all antiquity, as I need not labour to illustrate it more; only it hath been the ill hap of Our *Countrey Bathes to lie more obscure then any other throughout Christendome, although they deserve as well as the best, because very few have written any thing of them, and they either have not mentioned, or but slightly passed over the main points concerning their causes and originals; contenting themselves with an emperical use of them. This hath made me, through the instigation also of some of my worthy friends, to attempt somewhat of this kind: which if it give not satisfaction according to my desire, yet may be a provocation to some others, to perfect that which I have begun. And seeing I do it for the use of my Country, I have neglected*

curious ornaments to garnish it withall, but have clad it in a plain Sute of our Country Cloath; without welt or gard: not desiring it should shew it self in forain parts: Mea cymba legat littus.

But in this mine undertaking, I find my self exposed to many censures, both concerning some Paradoxical Opinions in Philosophy, which notwithstanding I deliver not gratis, *but confirmed with good grounds of reason and authorities: as also concerning the reformation of our Bathes, which do daily suffer many indignities more wayes then I have mentioned, under the tyranny of ignorance, impostures, private respects, wants, factions, disorder, &c. so as they are not able to display their virtues, and do that good for which God hath sent them to us; and all for want of such good government as other Bathes do enjoy. I blame not our City herein, unto whose care the ordering of these Bathes is committed, the disorders and effects being such as are out of their verge, and neither in their power, nor in their knowledge to redress. For they have sufficiently testified their desire of reforming all such abuses, when they voluntarily did joyn in Petitioning the late King* James *of blessed memory, to that end: by whose death this Petition also died. And they knew well that it must be a superior power*

that

that muſt effect it. In theſe reſpects I have need of ſome noble and eminent Patron to protect both me and my Bathes, whoſe cauſe I take upon me to plead, and to advance, according to their due deſert: but eſpecially for the Bathes ſake, which I deſire may flouriſh to the utmoſt extent of benefit to the people; and to have all impediments removed out of their way, which may hinder them in the progreſs of their virtues. This is the cauſe Sir, why I preſume to dedicate theſe my labours to your Honour, who having obſerved in forrain parts, the uſes and governments of all ſorts, and being both by the favour of his Majeſty well able, and by your noble diſpoſition well inclined and willing to maintain good order and diſcipline, will, I doubt not, excuſe this boldneſs, and pardon my preſumption. Conſider Sir, that this is your native Countrey, which naturally every man doth affect to advance, and theſe Bathes are the principal Jewels of your Countrey, and able to make it more famous then any other parts of this Kingdom, and in advancing them, to advance your Name to all poſterity. Wherefore howſoever my ſelf deſerve but ſmall reſpect from you, yet I beſeech you reſpect the Bathes of your Countrey, and me as a wellwiſher unto them.

And as the common opinion of your great worth and abilities, have moved me to this boldneſs, ſo the particular favours of your Noble Lady, and the encouragement of your learned Phyſitian, Doctor Baskervill, *mine eſpecial Friend, who hath ſpurred me on to this work, have removed out of my mind all ſuſpition of miſconſtruction. But that as mine intent hath been meerly the enlarging of the knowledge of thoſe points concerning Bathes, and more eſpecially of our Bathes in* Somerſet-ſhire; *ſo you will be pleaſed to accept of this publick invitation by me to do your Countrey good, and your ſelf honour, which I wiſh may never be disjoyned. And to me it will be no ſmall encouragement to devote my ſelf and my beſt endeavours to your ſervice. So I humbly take my leave this* 23. Aprilis, 1632.

Your Lordſhips moſt humble ſervant,

ED. JORDEN.

A Preface
TO THE
READER.

THE enſuing Diſcourſe of *Natural Bathes, and Mineral Waters*, of the learned Author, Dr. *Jorden*, having found ſo kind an entertainment in the World, as to have paſſed the Preſs twice in a Year; and the Copies of both Impreſſions at this time ſo few, as not to anſwer the Enquiries of perſons deſirous to peruſe them, a third Edition was neceſſary, the Care of which, together with ſome Additional Enlargements, being requeſted of me, I thought it might be a thing acceptable to many, to view the Work, and revive the memory of ſo worthy a Perſon. Eſpecially in this looſe, and quaking age of ours, in which Empericks, and juggling Medicaſters do ſo much abound, that 'tis almoſt as hard a matter to meet with a regular and well accompliſh'd Phyſitian

Physitian now, as it was in former times for *Diogenes* to find an honest man.

The great occasion of this general abuse of Physick I observe to be, mens beginning usually at the wrong end. For the most supposing the Practice of Physick to be a mere Trade, and Medicines the Ware to furnish themselves withall, make what haste they can to get, though upon Credit, a Pack of Receits, which they cry up as the most effectual, and *Triarian* Remedies; and having made a shift to truss up, with the former fardle of Common Receits, some few Specificks, presently set up for eminent Physitians, when, to give them their due, they deserve nothing less then that Honourable Name, being indeed but Pedlers in the Faculty.

For there are, besides the use of Medicines, which in its proper place is not to be neglected; many very significant things to be known and studied by a Physitian; as, after the præliminary helps of the Tongues, and Natural Philosophy, the structure and uses of the parts of the body; the virtues of Plants; the compositions of Medicines; the Nature, Causes, and Signs of Diseases; not to mention the knowledge, at least, if not the practice of

of Manual Operations, with ſome Pyrotechnical Endeavours. All theſe, vaſt dominions in themſelves, a Son of Art (to make bold with one of their expreſſions) ſhould in ſome meaſure command. So that I have in my thoughts ſometimes reſembled a Compleat Phyſitian to the draught of a Man, ſtanding on the two Legs of Anatomy & Herbary, Operating (if need be) with the hands of Chyrurgery, and Pharmacy, having a Chymical Head, and the bulk of his body made up of the Nature, Kind, and Cures of Diſeaſes, which we may not improperly, term a Body of Phyſick.

But theſe Agyttæ, and Quackſalvers, are as far from theſe ὅσον ὄυρανός ἐς' ἀπὸ γαίης. They for the moſt part, know no other tongue then their Mothers, and are as deſtitute of Philoſophy, as a rational method. Every Plant to them is All-heal, and every trite Medicine a *Panpharmacon*. The Body of Man, they think contains no other parts then what they ſee in a Harſelet, and the fire is as dreadfull to them, as to the burnt Child. Yet they will ſometimes make bold to uſe the Lancet, and dextrouſly wound the Heart through the Arm. In brief, they meddle with what they do not underſtand, and

are

are the ſpots, and ſtains of the Faculty to which they moſt injuriouſly pretend, but to reſign thoſe Juglers to their Ignorance and Self-Conceit, and thoſe that are willing to die at a cheaper rate to their cruel mercies, and confident Undertakings, I ſhall give what account I can of the Author of this Book (a man of a temper quite different from the former) & what alterations have been made in it.

As to the Author (whom I had not the happineſs to know otherwiſe then by this his Picture, being at the time of his death, and ſome years after in an incapacity of knowing any thing unleſs only a knowledge of Præexiſtence; yet) I underſtand he was a Gentleman of a good Family, and being a younger Brother, was by his Father deſigned for a Profeſſion, for which when he had accompliſh'd himſelf by a convenient Courſe of Studies in his own Country (I think at *Oxford*) travelled abroad to ſee the manners and cuſtoms of the Univerſities beyond *Sea*; and having ſpent ſome time there, eſpecially at *Padua* (where he took his Degree of Doctor in Phyſick) returned home, became an eminently ſolid and rational Philoſopher and Phyſitian, and one of that famous and learned Society, *The Kings Colledge of Phyſitians there.* In

In his Travels, undertaking in the company of ſome zealous Jeſuites, the defence of the Proteſtant Religion, he ſo much troubled their patience, that they reſolved to terminate that diſpute of his in a perpetual Silence, which they had effected, had not his Countryman, one of the number, but more mercifull then the reſt, (by awaking him out of his natural ſleep, preventing the ſleep of death) informed him of their deſign, to be put in execution that night; whereupon he preſently withdrew, and left not only the Houſe, but the Place, and eſcaped the cruelty of theſe blood-thirſty Religioſo's; who ſhortly after his departure, brake open his door, entred his Chamber, and approached his Bed, with a full reſolution to have acted their execrable Tragedy.

He had a great natural inclination to Mineral Works, and was at very great Charges about the ordering of Allum, which ſucceeding not according to expectation, he was thereby much prejudiced in his Eſtate; of which he complains in the 48 page of the following Diſcourſe. He was much reſpected by King *James*, who committed the Queen to his Care, when ſhe uſed to Bathe, and

gave him a Grant of the Profit of his Allum Works, but upon the importunity of a Courtier, as I am informed, afterwards revoked it; whereupon the Doctor made his application to the King, but could not prevail, though the King seemed to be more then ordinarily sensible of his Condition.

Whilst he practised in *London* there was one *Anne Gunter*, troubled with such strange and unusual Symptomes, that she was generally thought and reported by all that saw her to be bewitch'd. King *James* hearing of it sent for her to *London*, and pretending great pitty to her, told her, he would take care for her relief, in which thing he employed Doctor *Forden*, who, upon examination, reported to the King, that he thought it was a Cheat; and tincturing all she took with harmless things, made her believe that she had taken Physick, by the use of which, she said, she had found great benefit. The Doctor acquainting his Majesty that he had given her nothing of a medicinal nature, but only what did so appear to the Maid, and also, that though when he repeated the Lords Prayer, and Creed in English, she was much out of order, yet at the rehearsal of the same in Latine she

was

was not concern'd, the King was confirmed in what he had ſuſpected before, and the Doctor had ſuggeſted. Whereupon the King dealing very plainly with her, and commanding her to diſcover the Truth unto him, the maid, though at firſt very unwilling to diſcloſe the Juggle, yet, upon the Kings importunity, and promiſe to her of making up what damage ſhould accrue from the diſcovery, confeſſed all, and his Majeſty received from her own mouth this Account. That ſometime before there happened a difference between a Female Neighbour of her Fathers and himſelf, and having in his own apprehenſion, no better way to be avenged of her then this, impiouſly cauſed his Daughter, on the receiving of the Sacrament, to engage to imitate one bewitch'd, and aſcribe it to that woman, which ſhe did, and acted this part in ſo exact and wonderfull a manner, that ſhe deceived all the Countrey where ſhe lived, who thought it to be a truth. After which Confeſſion ſhe was very quiet, & the King giving her a Portion, ſhe was afterwards married, being by this ſubtle artifice perfectly cured of her mimical Witchery.

His Wife was a Gentlewoman of a Name

Name differing but in one letter from his own, Daughter to one Mr. *Jordan*, a *Wiltshire* Gentleman; which came to pass after this manner. The Doctor being on a Journey, benighted on *Salisbury Plain*, and knowing not which way to ride, happened to meet a Shepherd, of whom he made enquiry what places were near, where he might have entertainment for that night; the Shepherd telling him there was no place near enough for him conveniently to reach in any seasonable time, the Doctor asked, what Gentleman lived thereabouts; the Shepherd replyed, there was one Mr. *Jordan*, not far off, a man of good quality, and a great estate. Presently the Doctor (looking on this as a good Omen) resolved on his house, where he was so kindly entertained, and so well accepted, that Mr. *Jordan* understanding him to be a Batchelour, bestowed his Daughter on him, with a considerable Fortune.

After he had practised some time in *London*, he came hither, and setled at *Bathe*, where living many years, his Conversation was so sweet, his Carriage so obliging, & his Life so answerable to the port & dignity of the Faculty he profes-

sed

ſed, that he had the Applauſe of the Learned, the Reſpect of the Rich, the Prayers of the Poor, and the Love of all.

I hear but of four Children he had that attained to any maturity of age (beſides one who periſhed by that, which by the bleſſing of God, and the aſſiſting help of proper Remedies, hath prolonged the life of many, the *Bath.*) Two Sons, and as many Daughters. *Edward* the elder, being an Officer in the unhappy deſign of the Iſle of *Rhee*, was there unfortunately ſlain, making his Colours, he managed, his winding ſheet. The younger, *Benjamin*, or rather *Benoni*, the Son of his affliction, a man more profuſe and extravagant, deſiring to try his Fortunes in the world, died in obſcurity. *Elizabeth* his eldeſt Daughter was married to Mr. *Thomas Burford*, an Apothecary in *Bath*, and Mayor of the City; and *Mary* his youngeſt Daughter died in her Virginity, before her Father.

The Doctor alſo living a ſtudious and ſedentary life, which might encourage his two grand diſtempers he laboured under, the Stone and the Gout, in the ſame year in which this Treatiſe was printed, to which he imparted his laſt breath, departed this life, in the great Climacte-

Climacterical year of his Age 63. and of our Saviours Nativity, 1632. leaving behind him the name of a judicious, honeſt, and ſober Phyſitian, and the excellent example of a pious Chriſtian; on whom I ſhould have thought it no trouble to have ſpent more Ink, could my diligence which was not wanting in this thing, have procured me ſufficient information.

But κεῖται παλαιὸς; the Doctor is dead, and this Child of his ſurvives the reſt, which happening to fall into my hands for a review, I could not but uſe it with all the tenderneſs and reſpect, confeſſedly due to the juſtly celebrated Off-ſpring of ſo deſerving a Parent, whom it ſo very much reſembles. And, I hope, as I have here done the Doctor right, ſo I have not elſewhere done his Diſcourſe any wrong, which I had ſome intentions at firſt to enlarge much more, but on ſecond thoughts I judged it more convenient, only to draw up a Table of the Minerals he mentions, with the addition of ſome few marginal Annotations, and to ſubjoyn the greateſt part of what I had to adde of mine own, by way of Appendix (though ſome things there are of a different nature from his deſign) which

Which I intend hereafter, as opportunity shall serve, to augment and amplifie into an Hiſtory of *Bathe*. By the performance of which, though I shall not be so bold with some, on a more trivial account, to say, I shall oblige mankind; yet I think I may this, that I shall then, in any mans judgement, have done enough, to deserve a Civil Respect, from that is concern'd, supposing it now a sufficient honour to bear up the Train of my Learned Predecessor.

T. G.

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a *Libellum*

Libellum iſtum DE AQUIS MEDICATIS *a Doctiſſimo* JORDANO *antiquiſſimo Collega noſtro ſcriptum multiplici eruditione & novarum ſubtilitatum varia ſupellectile refertiſſimum, legimus, & qui ab omnibus tam Philoſophis quam Medicis legatur digniſſimum judicavimus.*

JOHANNES ARGENT
Collegii Medicorum Londinenſium Præſident

JOHANNES GIFFORD.
SIMON BASKERVILLE.
THOMAS RIDGELEY.

In laudem operis.

Parve Alacri passu liber, Liber, ibis in orbem;
Dentesque spernes lividos.
Authores pandit, sua dat Jordanus, & usu
Quæsita multo protulit.
Aera qui totus, flammas meditatur, & undas,
Terram, metalla discuit.
Quicquid in his veteres, docuit quicquid Novus
Celeri notavit pollice. (*Author,*
At sua dum exponit, lucem dat, operta recludit,
Pennaque fertur libera.
Perge liber; gratus gratum volveris in ævum,
Lymphæ calentes dum fluent.

Ed. Lapworth, M. D.

In laudem Authoris.

Numine divino Jordan *medicabile flumen*
Dicitur, è gelido licet illud frigore consset:
Tu Jordane *decus Medicorum, candide Doctor,*
Lumine divino gnarus discernere causas
Ægris corporibus nosti depellere morbos;
Intima secluse penetrasti viscera terræ,
Thermarum vires aperis, reseraque metalla:
De gremio telluris aquas manare calentes
Qua ratione doces, nobis prius abdita pandis
Scrutando Physices arcana indagine mira,
Nec cuperis fama, nec inane laudis amore,
Ut patriæ prosis, dignaris promere lucem:
Qui memor averunt, vel qui modo Balnea tractant,
Non sunt te melius meriti, vel judice Momo.

 Jo. Dauntsey.

Ad Authorem.

SI fœlix, rerum potuit qui noſcere cauſas,
Inter fœlices tu prope primus eris.
Sunt, quæcunq; tulit vel terra, vel unda, vel aer,
Singula nota tibi, ſingula certa tibi.
Omnigenæ tibi vena reperta, reſecta metalli,
Nullaq; te in quovis corpore vena latet.
Non tu nominibus veterum terreris, ut umbris,
Nec tibi, cen multis, quæ nova ſola placent.
Et docta & juſta ratione ſingula lance
Libras,, quæ veteres, quæq; tulere novi.
Nec cauſas tantum ſcrutans tu negligis uſum:
Utilis eſt liberi pagina quæque tui.
Hoc unum doleo, quod non ſint Anglica noſtra
Balnea, per calamum facta Latina tuum:
Creſceret ut gentis per te ſic gloria noſtræ
In longos celebris per loca cuncta dies.

COme hither Reader, bathe thy tender eyes
In *Jordans* ſtreams which out of *Bath* do riſe
They'l clear thy ſight, and make thee clearly ſee
Choice ſecrets, which in earths deep boſom be
Cloſely laid up, and choicely ſecret kept,
Where unobſerv'd they many ages ſlept.
Here come & Bathe in *Jordans* ſtreams thy mind
Thou there a ſtrange yet certain cure ſhalt find,
Of old ore-ſpreading errors leproſie,
Which theſe clear ſtreams do ſweetly mundifie.
Here are two miracles of nature met,
Here are two miracles of *England* ſet;

Our Engliſh Bathes, our Engliſh *Jordans* ſtreams
Are gathered here as natures choiceſt creams,
Produc'd by her, by learned Art refin'd
For th' univerſal good of humane kind.
May much good hence be rais'd, & may it raiſe
As well firſt Authors as Inventors praiſe.

Nicol. Stanghton, of *Stanghton*, Eſq;

BIS duas gaudes numerare cauſas
(Nam tot Authores varii dederunt)
Unde Thermarum calor ortum haberet
(candide Doctor)
Tu tenax, nulla, tamen acquieſcis
Ex iis cauſis: mihi dic (amice)
Cur tibi ſoli via ſingularis
perplacet iſta?
Arrogans forſan nimis ipſe multis
Qui viam linquis, videare, tritam:
Zoili & nigro vocitere vanus
ore Philautus.
Sed cui candor tuus innoteſcit,
Qui tuos mores bene novit; is te
Litis oſorem vocet, & ſerenæ
pacis amantem.
Sint licet Plato Socrateſq; amici,
Tu licet doctos verearis omnes,
Veritas major tamen eſt amica,
quæ tibi cordi eſt.

Rob. Pierce Bach. in Theologia.

To the Author.

SHall I presume to write in praise of him
Whose work hath taught the world more wit and Art,
And shall I not mine own dispraise begin,
To undertake and cannot reach in part
His worth, his wit, his learning which confounds
Grave Antients in their long tradition grounds?

Celsus could brag *Homunculos* to make
Man to preserve a thousand years or more,
Yet on himself he did so much mistake,
He could not hold his life till full threescore:
Before he made, his maker him did mar,
In this his words and works came short by far.

But modest *Forden* void of these conceits. (soul,
Hath clear'd obscurest points from darkness
His learning, judgement, body, soul all waits
Life to preserve in all; his lifes chief soul
Being learning, knowledge, and the love of truth,
He hath made men himself perpetual youth.

I. St.

AGes in former doubtfull errors night
From many worthy Stars have borrowed light.
Our Sun adorns our daies, whose radiant beams
No heat, but truth add to our bathing streams.
A fit work for an Artist, whose pen bleeds
To death-receiv'd opinions: shews the seeds

Of

Of earth-intombed Minerals, which lend
Heat by their birth to fountain Nymphs, who
Their pious tears in pity to regain (spend
Strength to the frozen nerves, sweet ease from
pain.
Who would not strive to celebrate that quill,
Which doth no fretting gall, but milk distill
To foster truth; being so concise and terse.
For to comprise the Protean universe
In this small volume: which who disapprove,
Snarling expres's neglect of lending love
To learning, tenant in this worthy pile,
Where natures works are polish'd by Arts file.
'Tis strange in dayes of ruffling impudence,
Which pamphlets spue of faction fearing sense,
Art should be bashfull: if you search, you'l meet
It valid in each page, shrouded in each sheet;
Asham'd of their rude folly, whose mouths swell
To slander worth they nere shall parallel.
I'le venture natures tell-tale him to call,
And judge my verdict's not Apocryphall.
Heaven and earth seldom such conceal'd births
steal,
But he the cause can publish, means reveal.
Take then a true survey, his lines descry,
More trusted fables, then the truth did try;
And pay *Machaon* as a friendly fee
For purging of diseas'd Philosophy,
The tribute of thy praise, though folly fret,
Such as it made wise will repay the debt. (pains,
Purge foul mouths (Bathe) that all applaud his
Who purgeth bodies, and refines the brains.

Bartholomew Man.

On the Sight

OF

Dr. JORDEN'S

Picture.

THis faint reſemblance *ſhews the Seat*
Where once dwelt Art *and* Learning
Great;
But vail'd *with ſuch a modeſt* Meen,
That 'twas not eaſie to be ſeen.
'Tis skill in Artiſts to conceal;
The Load-ſtone's *ſtrongeſt* cap'd *with* Ste
Thrice happy Painter, *and more, if*
Thine Art could lend him breath, *as* life.
That balks *with thine, all humane power*
If but requeſted for an hour.
'Tis he *that* Adam *made of* Duſt,
And Eve *out of his* Rib, *he muſt*
Inſpire Atomes, *by* his *might*,
Mans breath would ſcatter, not unite.
Yet a thing like him thou *haſt made*,
And we *as well as it, are* Shade.

T. GUIDO

OF Natural Bathes, AND Mineral Waters.

CHAP. I.

Explication of the word Bathe. *The scope and argument of this Book. The ancient use and esteem of Bathes among the Romans. The modern use of them among the Turks. Of Medicinal Bathes, and Mineral Waters. How esteemed by the Greeks, Latines, Arabians, and other Nations.*

THE word *Bathe* or *Balneum* is of larger extent then I purpose to discourse of: for it being the name of a form of Remedy applyed to the Body, it may be framed either out of liquid things, or solid substances, or vapours.

Liquid Substances are Water, Milk, Must, Wine, Oyle: Solid Substances are Sand, Salt, pressed Grapes, Corn, &c. Vapours are Stuphs and Hot Houses.

My intent is only to treat of Waters, and principally of those which be called Mineral, whether they be used in Bath or in Potion, &c.

These kind of watry and vaporous Bathes have been in use from all antiquity, and held in great esteem, both for pleasure, and for preservation of health. For there is no form of Remedy more comfortable to mans body, or which easeth pain and wearines more speedily, and more effectually. And whereas *Hypocrates* commends those Remedies which do cure *cito, tuto, & jucunde*, speedily, safely, and with comfort; these Bathes perform all these intentions: and besides, may be used to all Sexes and Ages, and Temperatures, without hurt or inconvenience, insomuch as the antient Romans had them in very frequent use: their Diet being liberal, and upon variety of Meats, especially upon Lettuce, Coleworts, Asparagus, raw fruits, and such like, which bred crude humours in their bodies, and had need of some such help to digest them: as *Columella* saith, *Quotidianam cruditatem laconicis excoquimus*: we concoct our crudities by the use of Bathes. We read in *Plinie*, that *Agrippa* built in *Rome* 170 publick Bathes for common use, and *Pancirollus* tells us of 856 in *Rome* at one time, and all of them most sumptuous and magnificent buildings, especially the *Anthonin* and *Diocleſian* Bathes: the Walls whereof were of admirable height, with an infinite number of Marble Pillars,

De deperditis pag. 164.

lars, erected for oſtentation, and not to ſupport any thing, 1000 Seats to ſit in; Their *Caldaria, Tepidaria, Frigidaria,* moſt ſumptuous and ſtately: the whole fabrick ſo large and ſpacious, as they reſembled rather Cities than Houſes: And ſo it might well be, when as there were imployed for the building of the *Dioclefian* Bathes, as *Baccius* ſaith. 40000 men, but *Salmuth* ſaith, 140000 for ſome years together. They were placed where now the Church of Saint *Angelo* ſtands. The Turks at this day retain that antient cuſtome of the Romans, and are in nothing more profuſe, then in their Temples and Bathes, which are like unto great Pallaces, and in every City very frequent. And yet both the Romans and the Turks uſed thoſe Bathes chiefly for pleaſure and delicacy, and cleanlineſs: the Romans going bare-legged, and their wayes duſty, had need of often waſhing; and the Turks lying in their Cloaths, ſubject to Lice and Worms, if it were not for their often bathing.

Belonius obſervat. lib. 2. c. 34 Proſper Alpinus de medicina Ægyptiorum.

Moreover, the Diet of the Turks, though it be more ſparing then that of the Romans, yet it is little better: namely, upon Herbs, Roots, raw fruit, &c. and their Drink, for the moſt part Water, being prohibited the uſe of Wine by their Religion, muſt needs breed many crudities in their bodies, yet by their often bathings, they do not only overcome them, but get a good habit of body, their Women being accounted as delicate creatures as any in the world, who duly twice a week reſort to the Bathes.

Now if thoſe Nations would beſtow ſo much upon their Bathes of delicacy and pleaſure, which

were only of pure Water; we have much more reaſon to adorn our Mineral Bathes; which (beſides the former uſes) are alſo medicinal and very ſoveraign for many Diſeaſes, conſiſting of wholſome Minerals, and approved for many hundred years, of many who could not otherwiſe be recovered. At the leaſt wiſe if we do not beautifie and adorn them, yet we ſhould ſo accommodate them, as they might ſerve for the utmoſt extent of benefit to ſuch as need them.

For there is nothing in our Profeſſion of Phyſick more uſeful, nor in the works of Nature more admirable, (man only excepted, which *Plato* calls the great miracle) then Natural Bathes, and Mineral Waters. The nature and cauſes whereof have been ſo hard to diſcover, as our antient Authors have written little of them, holding them to be ſacred or holy, either for that they judged them to have their virtue immediately from God, or at leaſt from the celeſtial Bodies; from whence, both their actual heat was thought to be kindled, by lightnings or ſuch like impreſſions, and other admirable Virtues, and ſometimes contrary effects derived, which appear in them. Alſo divers miracles have been aſcribed unto thoſe Natural Bathes, to confirm the opinion of a ſupernatural power in them, as *Guaynerius* reports of the Bathes of *Aque* in *Italy*: and *Langius* out of *Athenæus*, concerning the Bathes of *Edepſus*, which both loſt their vertue for a time. The one by the Magiſtrates prohibiting poor diſeaſed people to uſe them, the other by impoſing a taxation upon them: but upon the reformation of thoſe abuſes

Cap. 2. Epiſt. 53. lib. 2.

were

were reſtored to their former virtues again.

I need not herein averring the opinion of Divinity which was held to be in Bathes, make any mention of the Pool of *Bethesda*, written of by Saint *John*, and *Nonnus* the Poet: nor of the River *Jordan*, which cured *Naaman* the *Syrian* of his Leproſie, being indeed true miracles, and done by a ſupernatural power: yet it is likely that thoſe and ſuch like examples bred in the minds of men a reverend and divine opinion of all Bathes: eſpecially where they ſaw ſuch ſtrange effects as they could not well reduce to natural Cauſes.

And this hath been the cauſe that in old time theſe mineral fountains have been conſecrated unto certain Deities: as *Hamon* in *Lybia*, unto *Jupiter*: *Thermopilæ*, unto *Hercules*, by *Pallas*: among the *Troglodites*, another to the *Sun*, &c. And at this day we have divers Bathes which carry the names of the Sun, Moon, and Saints; and many Towns and Cities named from the Bathes in them: as *Therma* in *Macedonia* and *Sicily*, *Thermidea* in *Rhodes*, *Aquæ* in *Italy*, *Aquiſgraue* in *Germany*, *Baden* in *Helvetia*: and our antient City of *Bathe* in *Somerſet-ſhire*, in honor whereof I have eſpecially undertaken this labour, and I perſwade my ſelf, that among the infinite number of Bathes and Mineral Waters which are in Europe, there are none of more univerſal uſe for curing of Diſeaſes, nor any more commodious for entertainment of ſick perſons, then theſe are.

Beſides this ſacred conceit of Bathes, wherewith in antient times, the minds of men were

posseſt, we may adde this, that the nature of Minerals was not ſo well diſcovered by them, as it hath been ſince: and therefore we finde very little written of this argument, either in *Ariſtotle* or *Hypocrates*, or in *Galen*, who wrote moſt copiouſly in all other points of Phyſick, yet concerning this hath little; * and never gave any of theſe waters to drink inwardly, although he acknowledgeth that they were in uſe: and for outward uſes, held them all to be potentially hot.

De tuenda ſanit. lib 4. cap. 4.

*See the reaſon of this in *Ioncs* his *Bathes Aid*, fol. 7. b. where alſo he proves the inward uſe of Mineral waters among Phyſicians, as well before, as ſince the time of *Galen*.

After theſe Grecians, the antient Latines and Arabians ſucceeded *Plinie*, *Celſus*, *Seneca*, *Lucretius*, *Avicen*, *Rhaſis*, *Seraphio*, *Averrhoes*, in whom we finde ſome ſmall mention of natural Bathes, and ſome uſe of Salt and nitrous, and *Aluminous* waters, but nothing of worth toward the diſcoverie of the natural cauſes of them. It is likely they did paſs it over ſlightly, either by reaſon of the difficulty in ſearching out the cauſe of them, or that they judged them meerly methyſical. But in later times the nature and generation of minerals (from whence the Baths proceed and from whence the whole doctrin of them both for their qualities and differences, originals and uſe, muſt be derived) being better looked into and obſervations taken from ſuch as daily labour in the bowels of the earth, for the ſearch of Mines, or ſuch as afterwards prepare them for our neceſſary uſes; we have attained to better knowledge in this kinde, than the Antients could have, although in all new diſcoveries there will be defects for ſucceeding ages to ſupply, ſo it falls out in this: *Dies Diem docet*: *Aiphaw Br*

ta corrigit. And although *Agricola, Fallopius, Baccius, Matheſius, Solinander, Libavius,* &c. have added much unto that which was formerly known in this point, and reformed many errors and miſtakings in former writers: yet they have left many things imperfect, doubtful, obſcure, controverted, and perhaps falſe, as may appear in the diſcourſe following. I do reverence all their worths, as from whom I have learned many things, which elſe I could hardly have attained unto; and I acknowledg them to have been excellent inſtruments for the advancement of learning: yet I hope it may be as free for me without imputation of arrogancie to publiſh my conceits herein, as it hath been for them, or may be for any other:

Hanc veniam petimuſque damuſque viciſſim.
We both this leave, Give and receive.

My end and ſtudie is the common good, and the bettering of this knowledge: and if I ſhall bring any further light to increaſe that, I ſhall be glad: otherwiſe my intent being to ſearch out the truth, and not to contradict others, it will or ought to be a ſufficient protection for me, wherefore I come to diſcourſe of Mineral waters.

CHAP.

CHAP. II.

Definition of Mineral Waters. The nature whereof cannot be understood, except first consideration be had concerning simple water. Of which in this Chapter are shewed the qualities and use.

Libavius de judicio aquarum miscr. cap. 1.

MIneral waters are such, as besides their own simple nature, have received and imbibed some other qualitie or substance from Subterranean Mynes. I say, *besides their own nature*, because they retain still their liquidness and cold, and moysture, although for a time they may be actually hot from an external impression of heat, which being gone, they return to their former cold again. I say, *imbibed*, to distinguish them from confused waters: as earth may be confused with water, but not imbibed, and will sink to the bottom again: whereas such things as are imbibed, are so mixed with the water, as it retains them, and is united with it: being either Spirits, or dissoluble juyces or tinctures; I say *from Subterranean Mynes*, to distinguish them from animal or vegetable substances, as infusions or decoctions of herbs, flesh, &c.

Seeing then that the Basis of these Bathes or mineral fountains, is water, we must first consider the nature of simple water, and from thence we shall better judge of Mineral Waters, and their differences.

Baccius lib. 1. cap. 6.

By simple water I do not mean the Element of water, for that is no where to be found among mixt

mixt bodies, but I mean such water as is free from any heterogeneal admixture, which may alter either the touch or taste, or colour, or smell, or weight, or consistence, or any other qualitie, which may be discerned either by the senses, or by the effects. This water therefore must have his proper colour and taste, without savour or smell, thin, light, cold and moist; if any of these properties be wanting, or any redound, it is mixed and infected. *Solinander lib. 2. cap. 1.*

Cold and moisture do abound in water. For cold appears by this, that being heated by any external cause, it soon returns to his cold nature again, when the cause of the heat is removed. And whereas Air is held by the Stoicks to be most cold; and confirmed by *Seneca* and *Libavius*, yet the reason they give for it, doth seem to prove water to be more cold, because they make the matter of air to be water, and to have his coldness from thence. But *Aristotle* holds the air to be hot from the efficient cause which rarified it, being of more validity to make it hot, than water (the material cause) to make it cold. *Galen* is of neither side, for he doth not judge it to be hot, neither doth he ever pronounce it to be cold: but by reason of his tenuity, apt to be altered either by heat or cold. *Solinander lib. 1. cap. 3.* *Quæst. nat. 2.* *Libav. pyrotech. cap. 20.* *Meteor 4.* *De usu partium lib. 8. cap. 3.*

I will not here undertake to determine whether all be bred of water, or whether it be not a distinct substance of it self, and only receiveth watry vapours into it, being agreeable in cold, moisture, tenuity, &c. with it, and so lets them separate in rain: and so exonerate it self of these vapours, as also of dry exhalations by winds, thunder, *Daneus phis. Christ part 2. cap. 9.* *Aristot. 1. Meteor cap. 4.*

thunder, &c. or whether air be only the *effluvium* of the inferiour globe, being within the orbe of his virtue: as all Dominion hath not only a place of residence and Mansion, but also a verge and territory where it exerciseth his authority and government; so the inferior globe of the earth and water hath his dominion beyond his own globe, as likewise may be thought of all other globes of the Planets, &c. But these points are impertinent to my purpose. It is enough for me to shew what I judge of the temperature of the air concerning heat or cold. And to me it seem most probable, that the air of it self should be cold, as may appear by this, that it is only heated by external causes, which being removed, the air returns to his former coldness again. So we see that within the Tropicks in *Zona torrida*, as long as the Sun is within their Horizon, and beats the air with his perpendicular beams, it is exceeding hot, especially in the vallies, where the reflection is most; insomuch as *Aristotle* held those parts of the World to be inhabitable, in regard of the extremity of heat. But after the Sun is set the air returns to his natural coldness, until the Sun arise and heat it again. *Josephus Acosta* urgeth this argument against *Aristotle*, about the habitableness of the torrid Zone, that the daies and nights being there equal, the presence of the Sun in the day-time may well heat the air, but his absence for twelve hours more in the night reduceth the air to a better temper: and upon this and divers other arguments and experiences which cannot be denied, concludes, that if there be any Paradise upon earth, it is under or near the equi-

equinoctial. The like reason may be drawn from the coldness of mountains, which being near to the middle region of the air, and wanting that reflection of the beams of the Sun, which is in the valleys, are continually cold, and often covered with snow, which would not be if the air were hot. As for the conceit that the middle region is made cold by an Antiperistasis, the element of fire being above it, and the reflection of the beams of the Sun beneath it, it is an idle conceit. For these heats on both sides would rather heat than cool the middle region by their working upon it. Also take away the element of fire from under the Moon, which is an opinion now exploded by the best Philosophers, and then what becomes of your Antiperistasis? But I shall speak more of this Antiperistasis, *cap.* 13. And as for the reflection beneath, it is a weak thing, and will hardly extend to the top of a steeple: wherefore this coldness of the middle region is not from any Antiperistasis, but from the nature of the air, which there is not altered either by any influence from above, or by any vapours or reflection from beneath.

Davæus Philos. Christ. p. 2. c. 8. Cardan. de subtil. lib. 2. Valesius contr. lib. 1. cap. 5. Conradus Assachus de triplici cœlo lib. 1. cap. 4. Laurent. Valla, &c.

Neither would it be so cold neer the Poles, if the air of it self were hot. But the long absence of the Sun in those parts, and the oblique beams when it is present, do permit the air to enjoy his natural coldness. And as the air is of it self, and in his own nature cold, so is it probable that it is more cold than water, seeing it hath a greater power of condensation, than water, as we see it congeals water into ice, snow, hail, &c. which the water cannot do of it self. For in the bowels

of

of the earth, where the air cannot freely pass, water is never found to be congealed, unless it be compassed by some other substance equivalent to air in coldness, as Quick-silver, Nitre, &c. where cold is drawn into a greater compendium than in water, by reason of the density of the substances: and in ice and snow, the cold may be greater, by reason of the admixture of air. It is likewise probable that earth is more cold than water, if we consider it as it is in it self, and not mixed with other heterogenities. For as motion causeth heat, and levity, and rarity, so want of motion, which is in earth, causeth coldness, density, and ponderosity. But it is enough for our purpose to prove both air and water to be cold. As for moisture, *Aristotle* holds the air to be most moist, and water most cold. *Galen* holds water to be most moist. *Aristotles* reason for the predominance of moisture in Air is, because it is most hardly contained within his bounds: but the termination of things proceeds from their opposite qualities, as moisture is terminated by dryness, and dryness by moisture: and dryness doth as easily terminate moisture, as moisture doth terminate dryness. And this difficulty of termination in air, may more properly be ascribed to his thinness and tenuity of parts, than to his moisture. For dry exhalations will extend themselves as well as moist vapours; and as it is density that compacts, so it is rarity that extends. Fire it self is more hardly bounded than air, and yet not moist. Those that would reconcile these differences, do alledge that *Galen* speaks as a Physitian, and meant that water was *humidissimum medicamentum*:

Arist. 1. Meteor. cap. 3.

De ortu & inter. lib. 2. & meteor. 4. cap. 1. & 4. Gal. de simpl. med. fac. lib. 1. cap. 8. Item de Elementis 1.

Valesius cont. lib. 1. cap. 2.

dicamentum: Aristotle as a Philosopher meant it to be *humidissimum elementum.* But this reconciliation gives little satisfaction. For how the could water be *humidissimum medicamentum*, if it were not *humidissimum elementum?* For the simple qualities are more intense in the Elements, then in mixt Bodies, *cæteris paribus.* We speake of the proper operation of water according to his natural quality, and not as it may work by accident. Thinness and levity are two other qualities of simple water, which *Hippocrates* commends, and adds this experiment in another place, that it is quickly hot and quickly cold. *Galen* adds another experiment in the quick boyling of Peason and Beans.

De aere, aquis & locis. De morbis popular. lib. 2. sect. 2.

And whereas *Galen* produceth the boyling of Beans as a familiar example to shew the tenuity of water, we may gather that the use of Beans was common in those dayes, although the Pythagorean sect did then much flourish, which were thought to forbid the use of them. But I find that here hath been a great mistake, For *Aristoxenus* who wrote of the Life and Doctrine of *Pythagoras*, affirms that he did delight much in that kind of food: and our Physitians commend them for looſing the Belly, and drying of Rheums. But it seems the cause of this mistake was a Verse of *Empedocles*,

Brutrinus de re cibaria. Platerus in praxi.

Δειλοὶ παυδειλοι κυάμων ἀπὸ χεῖρας ἔχεσθε,

O miseri a fabulo miseri subducite dextras.

Thrice wretched men, from Cyams keep your hands.

As

As if he had forbidden the use of Beans, a poor occasion to pronounce them miserable which used them. But he meant it of continency and abstinence from venery, as *Aulus Gellius* doth interpret it: where κυάμους are understood to be *testiculi*. *Cicero* mentioneth the same of the Pythagoreans, but in another sense, because Beans were thought by their flatulency, to disturb our Dreams, and so to hinder the divination which might be gathered from them, as also *Middendorpius* judgeth: But to return to water: And it is requisite that water should have these qualities, in regard of the manifold and necessary uses of it, both for Man and Beast, and Plants: insomuch, as there is no living for any creature, where there is no water. It was our first drink to quench our thirst, and to distribute our nourishment as a *vehiculum* which it doth by his tenuitie; and after the invention of Wine, it was mixed therewith, as *Virgil* saith of *Bacchus*,

Noct. Attic. lib. 4. cap. 11. de Divinat. 1. In Aristæum quæstione 19.

Bretinus de re cibaria lib. 16. cap. 17.

Poculaque inventis Acheloia miscuit uvis,

And he that first found out the Vine,
Mix'd some Water with his Wine.

Where, by *Acheloia*, he means not only the water of the River *Achelous* in *Etolia*, but all other waters, as *Macrobius* proves out of *Antiphanes* and *Ephorus*: and *Scaliger* saith that the Greeks called all waters by that name, from the word ἄχθω. And since the planting of Vineyards, seeing all Countries could not be

Saturnal. lib. 5. cap. 18.

Grape

Grapes, *Bacchus* also taught the world to make *vinum è frugibus* with water, as *Diodorus Siculus* reports, from whence the Egyptians had their *Zithum* and *Curmi*, the Spaniards their *Cerea*, the Turks their *Conset*, and we our *Ale* and *Beer*; all which are extracted out of Corn, by the pureneſs of and tenuitie of water. By means whereof we have our Broths, Syrups, Apozemes, &c. extracted with it, as a fit menſtruum to receive the faculties of all medicaments and nouriſhments, eſpecially the ſecond qualities, and therefore it was antiently called *Panſpermia*: beſides the manifold uſes in waſhing, dying, &c. where that water is accounted beſt, which lathers moſt, being mix'd with Soap, of which I will not diſcourſe farther. Levity is another note of pure water, alledged by many, and ſerves well to diſtinguiſh it from many mixed waters, whether we reſpect the weight of it, or the moleſtation which it breeds in the bowels. This difference of weight is hardly diſcerned by ballance, both becauſe ſimple waters do very little differ in this point, and alſo many mixt waters, if they be only infected with Spirits, and not corporal ſubſtances, retain the ſame proportion of heavineſs with ſimple water: and alſo becauſe it is hard to have great Ballances ſo exact, as a ſmall difference may be diſcerned by them, yet *Agricola* reports that a cotyle of the water of Pyrene and Euleus, did weigh a dram leſs then the water of Euphrates, or Tigris, and therefore the Kings of *Perſia* uſed to drink of it, and held it in great account, as alſo the water of the River *Coaſpis*. Thus much for

Rerum antiquar. li. 4. c. 12.

Baccius l. 1. c. 7.

De nat. ex. quæ eſſ. è terra li. 1. cap. 15.

Langius Epist. lib. 1. Epist. 31.

for the qualities which simple water should have; for such as it should not have, I shall not need to spend time in discourse, being either such as the Senses will discover, if it be in taste, colour, smell, or touch; or the effects, if it be purgative, vomitory, venomous, &c.

CHAP. III.

Of the three Originals of Simple Waters.

Baccius lib. 1. cap. 3. 4. Agric. de ortu & causis subter. lib. 1. cap. 1, 2, 3, 4, 5, 6, 7, 8, 9. Solinander l. 2. cap. 1. & lib. 2. cap. 3.

NOW it followeth that we shew from whence these waters have their Original, which is no other then of the mixt waters, saving that the mixt waters do participate with some Minerals which are imbibed in them.

They haue three several Originals: the one from moist vapours congealed by cold in the air: the second from the earth; the third by percolation from the Sea.

1 From the Air.

For the first, it is certain that our Springs and Rivers do receive great supply of waters from the Air, where vapours being congealed by cold, do fall down upon the Earth, in Rain, or Snow, or Hail, whereby the ground is not only made fertile, but our Springs are revived, and our Rivers increased. As we see the Rhine and Danubius to swell more in Summer than in Winter, because then the Snow which continually lyeth upon the Alpes, doth melt by the heat of the Sun, and fills those Rivers, which have their Originals from thence up to the brinks. Also we see daily after much Rain, our small Lakes and

and Rivers to be very high. Also upon much dryth our Springs fail us in many places, which upon store of Rain do supply us again with water. And this is the cause that in most parts of *Africa*, near the Equinoctial, where it rains little, they have little water; and many times in two or three dayes journey, can hardly find to quench their thirsts and their Camels. *Leo Africanus* speaks of an Army wherein were many Camels, which in their marching, coming to a River, (perhaps it was but a Brook) did drink it dry. So that we must acknowledge that the Earth receives much water this way. But how this should serve the Bowels of the Earth with sufficient for the generations there, and for perpetual Springs, is very doubtfull; whereas *Seneca* saith that these waters do not pierce above ten foot into the Earth: neither if there were passages for it into the Bowels of the Earth, can the hundred part of it be imployed this way, but is readily conveyed by Rivers into the Sea. Wherefore although much water be yielded to the superficies of the Earth by Rain and Snow, and Hail from the Air, yet not sufficient to maintain perpetual Springs; seeing many times, and in many Countries these aerial supplies are wanting, or very spare, and yet the Springs the same. Wherefore *Aristotle* his opinion, which attributes all to aerial water and vapours from thence, is justly rejected by *Agricola*, and by our Countrey-man Mr. *Lydiat*. So that we must find out some other Originals, or else we shall want water for the manifold uses the Earth hath of it. From the Earth they make another Original of

Quæst. natur. lib. 3. cap. 7.

2 Meteorol. & 1. 3.

De ortu & causis subt. l. 1. c. 6. De orig. font. cap. 1.

a. From the Earth.

perpetual Springs and Rivers, seeing the first seems to be ordained by Nature only for the irrigation of the superficies of the Earth, which else would be in most places destitute of water, where Springs are not, and so would be barren, Plants and Trees wanting due moisture for their nourishment. Wherefore for the perpetuity of Fountains, and for subterranean generations, which cannot proceed without water, they have imagined a generation of water within the Earth; some holding that the Earth it self is converted into water, as Elements are held to be mutable and convertible, the one in the other. As *Ovid* saith of the conversion of Elements:

Resolutaque tellus,
In liquidas rarescit aquas, &c.

The Earth likewise, when once unty'd
Is into Water rarify'd.

Metam. 15.

But we must grant *Ovid* his Poetical liberty, and not tye his words to such a strict sense, although *Scaliger* in his Criticks would not pardon a Philosophical errour in the first verse of his Metamorphosis, for saying that forms are changed into new bodies. But unless there be some reciprocation between water and air, the other Elements are not convertible the one into the other. For neither Fire will be converted into any other Element being superiour to the rest, and not to be mastered by cold, which only must be the agent of the conversion of it by condensation: neither will the earth be converted into

into water, or any other Element, as *Plato* thinks in *Timæo*, and *Aristotle* 3. *de cœlo cap.* 7. for either heat or cold must convert it. Heat cannot do it, although it rarifie and attenuate, both for that it consumes moysture, and also because water is cold, which it should not be, if it were made by heat; for every natural Agent works to that end that it may make the Patient like it self: and heat may convert earth into fume and dry exhalations, but not into water, for all water which is not eternal, is from cold; likewise cold cannot convert earth into water, because cold doth congeal, condense, and congregate, and indurate, and not dissolve and attenuate, &c. as we see in Amber and Gummes. Neither will water be converted into earth. For by heat it turns to vapour and air, by cold into ice and stone; wherefore the Elements are not changed the one into the other, unless it be water and air, which have more affinity and more neighborhood than the rest. And yet it is doubtfull, as I have said in the former Chapter: but this generation of water from the earth is impossible. Others will have great receptacles of air within the earth, which flying up and down, is congealed by the coldness of Rocks into water, to supply all wants. Others imagine huge Lakes and Cisterns, primarily framed in the earth, and supplyed with water, either from vapour or air, or from the sea; which water either by agitation, by winds, or by impulsion from the Sea, or by compression of Rocks, is elevated to the superficies of the earth: or else vapours from thence, made by attenuation, either

Aristotel. 4. meteor. cap. 10. & ultimo.

Valesius de sacra Philosoph. passim.

from the Sun and Starrs, or from subterranean fire kindled upon Sulphur and Bitumen; which vapours ascending to the tops of Mountains, are there congealed into water by the coldness of the Rocks; where there must be other Cisterns or Castles in the air to feed the infernal Springs. Others will make the earth to be an animal, and to suck water by veins, to serve his turn for generations and nutritions. But why should it suck more than it hath need of? and how shall it cast it forth beyond the place of use, to the superficies of the earth? unless they will say that the Mynes which suck it, do puke it up as Infants do when their stomachs are full, which is absurd to say. These and such like devices are produced for the maintaining of their Original; which as they are all insufficient to afford such a proportion of water as is requisite, so most of them are so improbable, and full of desperate difficulties, as I am unwilling to spend time in the rehearsing of them, or their Authors, much more unwilling in the confuting of them, to trouble my self, and offend my Reader, only the point of subterranean fire which hath taken deepest impression in most mens minds, I shall speak of hereafter, when I come to shew the causes of the actual heat of Springs. The third Original is from the Sea, a sufficient storehouse for all uses, and whereunto the other two may be referred. For that which falls from the air, and that which is bred in the earth, do proceed principally from the Sea. *Agricola* for fear of wanting water for his Springs, is contented to admit of all these Originals, although he relyeth least

3 From the Sea.

De ortu & causis subter. lib. 1. cap. 5. & 9.

least upon the Sea, because he knows not how to bring it up to the heads of his fountains, but is contented it should serve for lower places near the Sea-coast. As I remember I have seen in *Zeland* at *Westcapell*, fresh Springs colated from the Sea, through banks of sand. But I make no doubt but that the Sea-water may serve all other Springs and Rivers whatsoever, although both far remote from the Sea, and high in situation. Neither shall we need to flye for help to those monstrous conceits of Agitation, Compulsion, Compression, Suction, Attraction by the Sun, &c. But holding the sacred Canon of the Scriptures, that all Rivers are from the Sea, &c. I perswade my self, that there is a natural reason for the elevating of these waters unto the heads of Fountains and Rivers, although it hath not yet been discovered. For those opinions formerly mentioned, will not hold water. *Ecclesiastes* 1.

My conceit therefore is this, that as we see in *Siphunculis*, that water being put in at one end, will rise up in the other pipe, as high as the level of the water (whether by his weight, or by the correspondence with his level, I will not dispute) so it may be in the bowels of the earth; considering that the passages there are more firm to maintain the continuitie of the water with the Sea, than any leaden pipes can be, being compassed on every side with many Rocks: as we see in *Venis, fibris & commissuris saxorum*. Now although perhaps this water enters into the earth very deep, yet the level of it must answer to the superficies of the Sea, which is likely to be as high as the superficies of the Land, seeing *Arist. meteorol. cap. ultimo lib.* 1

the natural place of waters is above the earth. And although neer the Coasts it be depressed and lower than the Shore, yet there is reason for that, because it is terminated by the dry and solid body of the earth: as we see in a cup or bowl of water filled to the top, we may put in a great bulk of silver in pieces, and yet it will not run over, but be heightened above the brims of the bowl. The like we see in a drop of water put upon a Table, where the edges or extremities of the water being terminated by the dry substance of the Table, are depressed, and lower than the middle, like a half globe: but take away the termination by moistening the Table, and the drop sinks. *This way of arguing is questioned by Dr. *French*, who supposeth the many great Rivers terminated in the Sea to be a sufficient moisture for the taking away the termination of the water made by the dryness of the earth, and so to make the globous Sea sink to an evenness. *vid. French Yorksh. Spaw.* p. 10, 11, 12.

If this be evident in so small a proportion, we may imagine it to be much more in the vast Ocean: and our Springs being commonly at the foot of Hills, may well be inferior to the Globe of the Sea, if any be higher, they may perhaps be fed from rain and snow falling upon the Mountains. But if *Josephus Acosta*, his assertion be true, that the Sea towards the Equinoctial, is higher than towards the Poles, then the level of the Sea may be much higher than the top of our highest Hills: but this is a doubtful assertion: yet I dare believe that if it were possible to immure a Spring without admission of air, which might break the continuitie with the Sea, our Springs might be raised much higher. At Saint *Winifrids* Well in Flint-shire, though there be no high land neer it, yet the Springs rise with such a violence, and so plentifully, that within a stones cast, it drives a Mill. It is likely that this Spring might be raised much higher. And whereas we see that Rivers

do run downwards to the Sea *per declive*, it doth not prove the Sea to be lower than the Land, but only near the ſhore where it is terminated, and in lieu of this it hath ſcope aſſigned it to fill up the Globe, and ſo to be as high as the Land, if not higher. For if a meaſure ſhould be taken of the Globe of the earth, it muſt be taken from the tops of the Mountains, and from the higheſt of the Sea, and not from the Valleys, nor from the Sea-coaſts. This conceit of mine I was fearful to publiſh, and therefore had written unto Maſter *Brigges*, mine antient friend, for his advice in it, being a point wherein he was well ſtudied: but before my Letter came to *Oxford*, he was dead. But now I have adventured to publiſh it, to ſtir up others to ſearch out the cauſes hereof, better than hath yet been diſcovered.

Exors ipſe ſecandi, fungor vice cotis.

Anothers edge, though blunt, I ſet,
And with the ſtone that's dull, I whet.

CHAP. IV.

Division of Mineral Waters. Minerals descr bed. Their kinds recited. Of Earth, simp and mixed. Whether it give any medicinal qualitie to Water. And so of the rest in t following Chapters.

THus much of simple waters, and their or ginals, which may serve as *Polycletus* r rule to judge mixed and infected waters by: *Galen* in many places speaks of an exact a sound constitution of body, as a rule to disce distempered and disproportionated bodies. A thus much in explication of the *Genus*, in the d finition of Mineral Waters.

Now I come to Mineral Waters, and to t other part of the definition which we call d ference, &c. from Subterranean Mynes by I bibition.

These Mineral waters are either simple compound; simple, which partake but w some one Subterranean Mineral; compou which partake with more than one. And th waters partake with Minerals, either as they confused with them, or as they are perfec mixed. Also these mineral waters, whether si ple or compound, are actually either hot or co the reason whereof must proceed from some Su terranean cause, as shall be shewed here ter.

Wherefore we must first know the nature o these Subterranean Minerals, and their generati

A
T A B
O F
MINER
WITH TH
QVALI

1. Earthly. — Simple, Dry, Cold, Astringen
   or mixed with
   - Nitre { Fullers Eart / Marle } Abstergent.
   - Allum / Coperas } All sorts o Boles, Astringent a
   - Bitumen, Pex, &c } Turfe } Fat, and Unctuo
2. Stone, vid. p. 27.

3. Bitumina.
   - Solid
     - Terra Ampelis.
     - Succinum.
     - Gagates.
     - Ambra
     - Camphora. { Borneo. / China.
     - Titantrax, sive Carbo fossilis.
   - Liquid
     - Petroleum.
     - Naphtha.

Potentia
Exc
Qu
34.

Salt Astringent, Detergent, Purgin

A
B L E
F
R A L S,
THEIR
I T I E S.

nt.

ringent and Deficcative. } Vid. p. 14, 25, 26.

d Unctuous.

Potentially Hot and Dry, in the 2. or 3. Degree; Except Camphir, concerning the Nature and Qualities of which Authors disagree, Vid. pag. 34.

, Purging, &c. Vid. pag. 47.

3. Bitumina.
- Titantrax, Eve Carbo fossilis.
- Petroleum.
- Liquid Naphtha.

4. Concrete Juyces.
- Salt, Astringent, Detergent, Purg
- Nitre.
  - Sal Ammoniacum.
  - Borax.
  - Altincar.
  - Vid. pa
- Allum.
- Vitriol.
  - Very astringent, and col

5. Spirits.
- Quicksilver; Various in its Qualities, vid. p. 6
- Sulphur; Moderately Hot and Dry, and somew
- Arsenick
  - *Auripigmentum*
  - *Risagalum*,
  - *Sandaracha*,
  - *Rusma*, &c.
  - Venomous, vid. p
  - Extreme hot and p
- Cadmia
  - Natural, Liquid Dangerous, and a
  - Factitious, Moderately, hot and cle

6. Mean, or half Metals; as
- *Bismutum*, or Tin-glass; Qualities not m
- *Antimony*, purgeth vidently upward and d
- Bell-metall, not used in Physick, vid. p. 6

7. Metals
- Perfect
  - Gold, Qualities uncertain, vid. p. 69.
  - Silver, Esteemed Cold, Dry, Astringen
- Imperfect
  - Hard
    - Iron, Opening and Astringen
    - Copper, Temperate in heat, vid. p. 70. 77.
  - Soft
    - Tinn, Cold and Dry, yet mov
    - Lead, Cold and Dry, vid. p. 7

Place this between page 24 and 25, where t

t, Purging, &c. Vid. pag. 47.

Vid. pag. 44. 51.

, and cold, Vid. p. 57, 58.

vid. p. 61, 62.
d ſomewhat Cooling, vid. p. 63.

ns, vid. p. 65.
hot and putrifying, p. 66.

g, and a ſtrong Corroſive,
and cleanſing, } vid. p. 66.

es not mentioned, vid. p. 67.
rd and downward, ib.
vid. p. 68.

p. 69. & 72.
ſtringent, Emollient, vid p. 69. & 74.

Aſtringent, vid. p. 70. 74, 75, 76.
in heat, leſs Aſtringent, and more cleanſing than Iron,

yet moving Sweat, p. 72. 77. 78.
vid. p. 72. 78. & 79.
where the 4th. Chapter of Minerals begins.

om whence Mineral waters receive their
rence, from common simple water, before
an judge of the nature and quality of them,
r Actual or Potential.

y Minerals, we understand all inanimate
ct bodies bred in Mines within the bowels
e earth. I dare not undertake to muster these
lue order by Dichotomies, seeing neither
icola nor *Fallopius*, nor *Libavius*, nor any
r that I know, have exactly done it, nor satis-
either others or themselves in it: and see-
there are divers Minerals lately discovered,
perhaps more may be hereafter, which have
een known in former times, and therefore
mentioned; as *Calaem* in the East-Indies,
na and *Terra gbetta* in Turkey, &c. Where-
I will make bold to reckon them up as they
e to hand in seven ranks.

Minerals reduced to seven heads.

The first shall be earth.

Earth, whether it be bred *ab exhalatione sicca* Earth.
rigerata, or *ex mistis per putredinem in limum*
versis, or *ex lapidibus sole aut calore coctis &*
de aqua solutis, &c. It is all inconcrete. As
tle water gleweth it together in *Lutum*, so a
t deal dissolves it. But this is no proper dis-
tion, but only a disjoyning of parts by Im-
ing the moisture which conjoyned them into
reater proportion of water; for waters do
urally run together, like drops of quick-silver,
nelted metal. Wherefore seeing the moisture
ch is in the earth, is not natural, but adven-
ous, not united essentially, but only mixed
identally, it may well be called an *inconcrete*
stance, whose moisture is easily drawn from
it,

it, being ready to unite it self with other moistu
Agric. de nat. fossil. lib. 1. cap. 4. and leave his old body as it found it, that i
duſt: yet ſo as that water retains with it ſo
taſte or qualitie which it received from the ear
This duſt is neither a ſimple body, as El
ments are, nor permanent in one and the ſa
kind: but as it is thought to participate with *a*
mals vegetables, and minerals, ſo to be tra
muted into any of them, being both Mother a
Nurſe to all terreſtrial bodies.

Simple earth, if it be not mixed with oth
ſubſtances, is dry and cold, and Aſtringent. B
if it be mixed, as commonly it is, it altereth h
qualitie according to the mixture. Mine inte
is to write of it as it is ſimple, and ſo of t
reſt.

Simple earth yields but a muddie water of
ſelf, and of no uſe in Phyſick, but if it be mix
with other Minerals, it makes the water to pa
ticipate with the qualitie of thoſe Minerals al
As if it be mixed with Nitre, as in Fullers ea
and Marle, it makes the water abſtergent li
ſoap. If with Allum or Copperaſs, aſtringe
and more deſiccative, as in all ſorts of Boles.
with Bitumen, fattie and Unctuous, as in T
Baccius lib. 5. cap. 1. and Peate, &c. We have divers examples
all ſorts. The Bath of Mount *Orbon* in *Italy*
full of clay, which is a kind of Bole. The Ba
Caldaria, full of Ocre. The Bath of Saint *Pet*
full of a yellow earth, tincted belike with ſo
other Minerals. Wherefore theſe are to be judg
of according to the ſeveral Minerals which th
contain. But ſeeing earth it ſelf makes little im
preſſion into water, neither do we make any Phy
ſic

ſical uſe of waters, which contain nothing but earth, I need not ſpend any time about them.

CHAP. V.

Of Stone.

THe ſecond ſhall be Stone. Stone is another Mineral ſubſtance, concrete and more heavy than earth, and our Mineral men confound themſelves much in the definition of it. Wherefore *Fallopius* implores the help of *Marcus Antonius Janna* about it, as one of the moſt difficult points in Philoſophie: but in the end, defines it *by his want of diſſolution, either by heat or moyſture.* And whereas it is manifeſt that ſome ſtones will melt, he imputes it to the admixture of ſome metal, among which he reckoneth glaſs. Others define it by his hardneſs, wherein commonly it goeth beyond others Minerals. But you ſhall have ſome ſtones ſofter than ſome of thoſe, and therefore the definition is not good. Others by this, *that being broken or calcin'd, they will not be conſolidated again into their former conſiſtence or ſhape.* But for breaking, the reaſon of that, is want of fuſion; for without fuſion or ignition, which is a kind or degree of fuſion, Metals alſo being broken, will not be conſolidated into the ſame Maſſe again. And there is no more difference in nature or eſſence, between a whole ſtone and a broken, than there is between a maſs of Metal, and the powder or filings of the ſame. As for calcination, other minerals may be ſo fat calcin'd,

De metallis cap. 6.

calcin'd, and brought to a Crocus by fire, as they will be irreducible, therefore this is not proper to stone. Wherefore I am of *Fallopius* his opinion in this point, and the rather because otherwise there would seem to be a species in nature wanting, if there were not Mineral Species wanting, dissolution by heat or moysture, as well as there are, having such dissolution. And this *vacuum* which nature abhors, is not only to be understood of a local vacuity, but also of a want of such species as are in natures power to produce for the ornament of the World. For if it be a natural passion to be dissolved, it is likewise a natural passion not to be dissolved: and if some things will be dissolved both by heat and moysture, as Salts, why should there not be other substances which will be dissolved by neither of them. And this must be stone, for nature affords none other. Moreover, according to *Aristotle*: *Quæ concreverunt a frigido & a calido, a nullo istorum dissolvuntur*; Those things which come together by heat or cold, are dissolved by neither of them: Of this kind are stones which could never attain to such purity as many of them have, if they were not congealed by heat as well as by cold. Also under what species shall we comprehend Diamonds, Talcum, black-Lead, which some think to be *gnigitis*, *Magnetis*, *Glymmer*, *Katzensilber*, *pyrimachus*, *amiantus*, *alumen plumosum*, *saxum arenarium mortuum*, *&c.* if not among Stones? yet these are confessed to be invincible by fire or water. Also all pretious Stones, the more noble and pretious they are, the more they resist dissolution either by fire or water:

water: for this quality sheweth the perfection of their mixture. True it is that some stones will be dissolved by fire or water, and therefore *Pliny* and *Agricola* divide Stones into fusible and infusible: but this is in regard of other substances bred in the stone; which if it be Metal, the fusion will be Metalline: If Nitre or mean Minerals, it will be Vitrificatory. As *Pliny* reports of the invention of Glass by certain Merchants, who melting Nitre upon the Sand in *Syria*, where with Clods of Nitre they had made a Furnace for their necessary use; found that clear Metal which we call Glass, *Ecce liquato nitro cum arenis visi sunt rivi fluxisse nobilis liquoris.* Behold, with the Sand, when the Nitre was melted, ran streams of a noble liquor.

If Sulphur, as in *Pyrite*, it will likewise melt and strike fire. And whereas the striking of fire out of a flint or Pyrites, or any other thing that will strike fire, is held by all men to proceed from the kindling of air, by the collision of two hard substances together, they are mistaken. For then Diamonds, Chrystal Glass, &c. should strike fire as well as flints; but it is the Sulphur contained in them: And *G. Fabricius* in his observations, although he observes not the reason of this fire, yet he confesseth that out of any Pyrites *è quo excutitur ignis, etiam excoquitur sulphur*; Out of which fire is struck, Sulphur also is to be had. *Pliny* gives the reason of the name, *quia inest illi ignis*; Because fire is in it. The like we observe in *Indian* Canes, and some Woods that are unctuous, and full of Oyle, which yield fire by trication, or collision,

collision, not by kindling the air thereby, but inflamable Oyle in them. For air being cold and moist, as hath been proved before, hath no agreement with fire, no more then oyle hath with water. And therefore flame is not the kindling of air (*flamma non est aer accensus*) but of fuliginous vapours, which have some unctuousness in them, and arise from the mater of fewel, and have some inflamable parts remaining in them: which neer unto the matter of fuel, do cause a manifest flame: but farther off, no flame doth appear: yet so as if you hold Flax near unto the flame, though it touch it not, yet it will kindle, by reason the fire extends further then it is visible, being a pellucide and transparent body, and thinner then the air it self. And this is held to be the cause why it is not visible under the Moon. And where without air fire goes out, and is extinguished, the reason is, because the fuliginous vapours wanting evaporation, do recoyle upon the fire and choke it. This is evident in cupping-glasses, and in making of Char-coal: where if the air be altogether excluded, the fire goes out; if but in part then although the flaming be hindred, yet the fire doth penetrate the fewel, and so converts it to coals: which by reason of the fuliginous vapours, are commonly black. *Bellonius* saith that Char-coals made of the wood of the Oak, cedar tree, are white; which must be ascribed, as I think, to the small quantity of fuliginous vapours which that wood doth yield: or else that those vapours are rather sulphurous, then any other combustible substance. As we see that Tinby Coals will not black linnen, be-

Verulamius de vita & morte, pag. 418. & 453.

De neglecta stirpium cultura problem. 13.

hang

hanged in the ſmoak of them, but rather whiten it, by reaſon of the drying and penetrating quality of Sulphur, which will make red Roſes white.

But what ſhall we judge of thoſe Lamps, which have been found burning in old Sepulchres? ſome of them (if we may believe Hiſtories) having continued 1500 years together, as that which was found in *Paulus* the third his time, of *Tullia*, *Ciceroes* Daughter: and another of *Maximus Olibius*, near unto *Padua*, as *Bernardinus Scardeo* reports. It ſeems here was no air to maintain the Lamps, being cloſely ſhut up in glaſſes, and therefore they burnt without air, and were not extinguiſhed, by reaſon they bred no fuliginous vapours to choak them.

Now whether theſe Oyles which fed the Lamps were made by Art out of Gold, as ſome think, and I hardly believe, or rather out of ſome pure kind of Naphtha, which is moſt probable, I leave to others to judge: only I judge it to be the purity of that Oyle, which yielded no fuliginous vapours to choak the fire. If air had maintained the flame, it had not continued two minutes, for it would have been ſpent and waſted by the fire. Wherefore *ignis non eſt aer accenſus.* If other concrete juice be mixed with Stone, as Salt, Allum, Vitriol, &c. it makes them to relent in water or moiſt air; and theſe Stones are never good to build withal. But let us take Stone as it is in it ſelf, without the admixture of other Minerals, and we ſhall find it to be indiſſoluble and invincible, either by fire or water. *Eraſtus diſput. part. 2. p. 105.*

Metallurgians, Refiners, and Aſſay Maſters, may

may make uſe of this for their Shribs, Tiegles, Muffels, Copels, Teſts, Hearths, Crucibles, Furnaces, &c. where they deſire a defenſible ſubſtance againſt fire. But it requires a preparation to cleer it from all combuſtible and diſſoluble admixture: as they may eaſily do, after they have powdred their Stone, to calcyne and waſh it well. This work being often repeated, will make it fit for their purpoſe: and they may uſe it either alone in the ſame manner as they do bone-aſhes, or they may mix it with their lome, brick-duſt, geſtube, &c. Alſo they may make Bricks of it for their Furnaces, which will hardly receive any injury from fire. Talcum alſo is a Stone invincible of it ſelf by fire: and Bricks made of Clay that is full of it, as the *Guendern* Clay in *Cornwall*, will hardly melt with any heat. Stones are naturally dry and cold, and aſtringent like a concrete earth.

Simple Stones which have no other Mineral mixed with them, and are come to their perfection, being indiſſoluble, either by fire or water: can yield no quality or virtue to Bathes, and therefore he that ſeeks to draw any virtue from ſtone into water, doth *lapidem lavare*, that is labour in vain. But by reaſon of admixtures they may, or whileſt they are in *ſucco lapideſcente*, before they are concreted. For if it be certain that Metals may yield virtue to Bathes, being alike indiſſoluble by water, there is no reaſon but Stones alſo may. *Fallopius* is againſt it in both, but contradicted by *Julius Caſar Clandinus*, and divers others; yet he confeſſeth that *Balneum montis Grotti*, hath *Gypſum*, and

In ingreſſu ad infirmos p. 373. Venuſtus in conſilio pro Petro Picardo.

Geſu

Gesner affirms the same of the Bathes of *Eugesta*. Also he finds *ramenta marmoris in Balneo Corsenæ & Agnano*, but he judgeth that they receive no quality but from the juice, and I doubt not but he is in the right. And for *Succus lapidescens*, we have many examples in *Agro Pisano & Lucensi* in *Italy*, in *Avernia* in *France*, where this juice is so plentifully brought by a clear Spring, that after it is congealed, the people dig the stones, and have made a great Bridge of them. Also neer *Vienna* in *Savoy*, in a Village called *Giret*, is a clear Fountain which turns to stones as hard as flints: *Pliny* makes mention of the like Springs in *Eubea*, which are hot: and *Vitruvius* of the like at *Hieropolis* in *Phrygia*: Also *Josephus Acosta* of the like hot Springs in *Guaniavilica* in *Peru*, which turns to stone, whereof they build their houses. *Anthonio de Herreza, cap.* 20. tells of the same Spring at *Guainia* at *Velica*, which turns to stone as it riseth, and kills those that drink of it. Also this *Succus lapidescens* is observed in the Bathes of *Apono*, where it is converted into stone upon the sides of the Bath. Also in the Bath of *Rancolani*, where this juice is not confused, but perfectly mixed with the water, and being imbybed by Plants, it hardens them like stone. *Baccius* tells us of a Cave by *Fileg* in *Transilvania*, which turns water into stone. The like is found at *Glainstayns* in *Scotland*, as *Hector Boetius* reports. In *England* also we have many Fountains which turn wood into stone; which must be by reason of this *Succus lapidescens* mixed with the water.

Baccius etym.

Lib. 6. . 14.

Coral also being a Plant, and nourished with this juice, turns to a stone: so doth the seed of Lithospermon or Gromel. Thus much of Stone.

CHAP. VI.

Of Bitumen. His kinds, qualities. Of Camphir in particular. That Bitumen is predominant in the waters of Bathe.

NExt I come to those Minerals which we call *Bitumina*, which are mineral substances that burn and waste in the fire without metallick fusion, or ingression. The greatest affinity they have, is with Sulphur: but this hath ingression into metal, and therefore I rank it among the Spirits, and *Bitumen* hath none. Of this kind some are solid, and some liquid. Solid, as *Succinum Gagates, Ambra, Camphora, Terra Ampelitis, Lithanthrax, sive Carbo fossilis, &c.* Liquid, as *Petroleum* and *Naphta*. All these are great fuel to fire, especially those that are liquid, which are thought to draw fire unto them, if it be within their *effluvium*: So *Pliny* reports that *Medea* burnt *Creusa* by anointing her Garland with *Naphtha*: and *Strabo* tells how *Alexander's* Bath-master *Athenophanes*, had almost burnt *Stephanus*, a Boy in the Bath, by sprinkling *Naptha* upon him, if it had not been suddenly quenched. And this is that juice or thick water which *Plato* in *Timeo* reckons among fires, and which the *Egyptians* used in their Sacrifices, and was hidden by the Jewish Priests in a dry

Machab. 2. 1.

pit for 70 years, and afterwards found by *Nehemiah.*

But whereas it is a common received opinion, that ſome of theſe *Bitumina* will burn in water, I cannot believe it; although *Pliny* and *Agricola*, and moſt that have written ſince, out of them do averr it, and bring arguments and examples to prove it. For although water were a fewel to fire, as oyle is, yet there can be no fire without air, and water excludes air; and ſo doth oyle, if the fire be beneath it, and covered with it: As for their arguments, they ſay that *Bitumen* being ſprinkled with water, burns more, and therefore water is a fewel to it: as wee ſee that Smiths caſt water upon their Sea-cole in their Forges: but the reaſon of this is, becauſe their Coal being ſmall like duſt, the water makes it to cake and bake together, where otherwiſe the blaſt would blow it way: alſo it hinders the quick burning of it, and ſo makes it continue the longer: ſo in a *Vulcano* after Rain, they find the fire to burn more, when the *Bitumen* is ſmal, and in duſt. Although this may be a reaſon of it, that the Lyme which hath there been calcined, being by Rain diſſolved, increaſeth the fire. And whereas they ſay that water will kindle *Bitumen*, and quench *Sulphur* it is not ſo: neither doth their example of Wild-fire prove it. For in Wild-fire, beſides Bitumen and Camphir, there is a double proportion of quick Lymes, which by reaſon of the ſudden diſſolution of his Salt, by the effuſion of water, is apt to kindle any combuſtible matter; not by reaſon of any Bitumen in the Lyme, as ſome imagine, nor of

any *Empyreuma* which the fire hath left in it, a

De sympath. & antipath. ca. 10. *Fracastorius* thinks: for, how can there be an Bitumen left in the Lyme (if there were any a first,) after calcination: the fire would have co sumed that before any thing else. And as fo any *Empyreuma*, it is certain that the more an thing is burnt, although the fire leave an aduſtio in it, the leſs apt it is to burn again, eſpeciall being burnt and calcin'd *ad calcem aut cinere* where all the combuſtible matter is ſpen Wherefore it muſt needs be by the violent mo tion which is in the ſudden diſſolution of the Sa in it, as appears by the crackling it makes: *E ex motu fit calor*; And motion cauſeth hea The like we obſerve in *Pyrite ſterili*, where they make Vitriol, which being broken an laid up in heaps, and moiſtned with water, wi gather heat, & kindle any combuſtible matter p to it. The like we find alſo in Allum Mines, &c where thoſe mineral juices being concrete in th Mine, when they come to ſudden diſſolution d grow hot, and will kindle fuel. And as for th example of the Salt Lake whereof *Agricol*

De nat. ex. q. effiu. è terra. l. 4. *c.* 22. writes, between *Strapela* and *Seburgh*, whic burns the fiſhermens nets if they be put near th bottome: and of the Lake *Sputa*, in *Medi* mentioned by *Strabo*, which burns Cloth put into it: I take that to be by reaſon of th corroſive quality of the Salt which frets them being ſtronger near the bottome; and not fro Bitumen, as *Agricola* thinks. The like I judg of the Lake by *Denſtadt* in *Turingia*. And is very probable that Salt being heavier th Water, will be moſt towards the bottome: as

is reported of the fountain *Achilleus* in *Mileto*, whose water is very sweet and fresh above, and very salt towards the bottom. So is the water of *Agnano* in *Italy*, as M. *Sandys* reports in his travels. And the more heavy and terrestrial any salt is, the more corrosive it is: and so contrarywise, the more corrosive, the more heavy. *Aristotle* affirms the Sea-water to be more salt at the bottom than above: and so doth *Pliny*, who likewise makes mention of the Lake *Ascanius* in *Chalcide*, whose top is sweet, and bottom nitrous. *Baccius* writes the like of a Well near *Toletum* in *Spain*, the water whereof is sweet above, and corrosive beneath; which he judgeth to be from Quick-silver. *Fallopius* is also of opinion, that Bitumen doth not only burn in water, but is nourished by water, because it makes the fire to last longer. But I have shewed the reason of that before. And for the burning in water, he should have said upon the water; for there it will burn as long as it swimmeth; but dip it under the water, and it is presently extinguished.

Meteor. 2.

Lib. 2. *c.* 11.

De Thermis. c. 5

And whereas some report that Queen *Ann* of blessed memory, being in our Kings Bath, there arose a flame of fire like a candle from the bottom of the Bath to the top near unto her, they must give me leave not to believe it, but rather to think they were mistaken: for, I am not bound to believe any thing against reason, which God hath given me to be my guide. It might have been some bubble of wind which is frequent in our Baths, or some bituminous matter not dissolved in the water, did arise, and being at the top, dissolve it self upon the surface in the form of a circle;

circle; but it could not be kindled. And if it might be kindled in the water (which were impossible) yet in all likelyhood it would have burnt better above the water than within it, and not be presently extinct, as they report. These *Bitumina* (excepting Camphir) are potentially hot and dry in the second or third degree; but

Of Camphir.

concerning Camphir there are two doubts. First, whether it be a Bitumen or a Gum. Secondly, whether it be hot or cold. The Arabians affirm it to be the gum of a huge tree with white leaves, under whose shadow many wild beasts may lye; and that after earth-quakes there is great plenty found; that it is in quality cold and dry in the third degree; some late writers follow them in their opinion of a Gum, as *Mathiolus, Amatus Lusitanus, Garcias ab horto, &c. Platearius* hold it to be the juyce of an herb. But we must consider that they make two sorts of Camphir, the one of *Borneo*, the other of *Chyna*. For that of *Chyna* they confess it is adulterated with Bitumen: and that is the only Camphir in use with us. But that of *Borneo* to be a simple Gum, and that a pound of this is valued as dear as an hundred pound weight of the other. So that all the doubt lieth in this Camphir of *Borneo*; which whether it be a Gum or no, is still in controversie. For the Arabians not trading into those parts had the notice hereof only from others, as *Serapio* and *Avicen* do confess: and *Amatus Lusitanus* saith the inhabitants will not suffer strangers to come ashore to see it. So as we have been kept in ignorance a long time from the true knowledge of it. And *Garcias ab horto* tells us,

Serapio de simp. m. d.c. 344.
Avicen. lib. 1. tract. 1. c. 2.
Item. l. 2. tract. 2. cap. 133.
Item. de med. cordial. tract. 2. cap. 3.

Is Dioscoridem cap. de mastich.

that

that all his knowledge of it, is but by relation; himself not being able to travel to see it, partly by reason of his age, and partly for his continual imployment about the Viceroy, yet he saith, that that he had a piece of the wood given him: Only *Edvardus Barbosa* reports that he did see the place in *Borneo*, and found it to be of a mineral nature. But *Barbosa* his testimony is not authentical, having failed much in other of his relations: as where he reports that the Purcelan of *China* is made of Oyster-shells, &c. He is contradicted by *Consalvus Mendosa* a man employed in those parts by the King of Spain, for such discoveries, and also by *Hugo a Linschoten*, a man of great observation, and both of them of far better credit than he. I procured some of that Camphir to be brought from thence by my worthy friend Captain *Best*, but whether it be a Gum or a Bitumen, by the view I cannot discern, But if it be a Gum, saith *Solinander*, why should it abound more after earth-quakes? and why should it burn and not dissolve in water? No Gums will burn, and all Gums will dissolve in water: and earth-quakes make no trees fruitful, but may cast forth minerals. That there is a natural bituminous Camphir, I make no doubt: and *Agricola* proves it sufficiently: And the Bath in *Remandiola* near *Rhegium* shews it. Also the Well by *Muntzbach*, where *Tabernomontanus* saith there is mineral Camphir. *Averroes* saith, it is *affinis Bitumini*.

Lib. 1. cap. 9.

De nat. fossil. lib. 4. cap. 2.

Thesaur. aquar. lib. 1. cap. 2.

I confess that when I published my first edition, I was perswaded by *Solinanders* judgement, to think all Camphir to be a Bitumen, and name-

ly that of *Borneo*, but since upon better enquiry, I find it otherwise. For Captain *Best*, besides the relations made unto him in the *Indies*, concerning this Camphir, that it was from a tree, hath also procured me the testimony of Master *Andrew Cogganel*, under his own hand, that both the Camphir of *Borneo* and *Sumatra*, are gums of a tree, and no Bituminous matter, himself having been at the gathering of it, and at the cutting down of some of the trees. He hath also traded much in that commodity, and vented it at *Japan*; where it seems, as also at *Chyna*, they mix and adulterate it with some other matter, to increase the substance, and abate the price; which mixture perhaps may be some Bituminous substance. This Master *Cogganell* hath lived 14 years in those parts, and speaks the usual language, and hath been often upon that Island of *Borneo*.

Now for *Solinanders* reasons, they are easily answered: no Gums, saith he, will burn, and all Gums will dissolve in water. I grant it, if you take the word Gum in a strict sense, for watry Gums, as Tragacanth, Arabick, &c. But we use the word Gum in a more general sense, comprehending under it all Rosins, Turpentines, Pitches, &c. which being unctuous and oily, will readily burn, and will not dissolve in water. Among these Gums or Rosins, we reckon Camphir, and so that argument is answered. As for his other argument drawn from earth-quakes, mentioned by the Arabians, after which there is commonly more plenty of Camphir: this doth not prove it to be a mineral; For earth-quakes are as apt

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to cast up fresh mould, whereby trees are made fruitful, as minerals. Wherefore let us subscribe to the antient Arabians, although they were not eye-witnesses hereof, and to the later observations of Spaniards and others; especially now that we have a Countrey-man of our own, who hath had as good means to learn the truth of this, as any European ever had; who is yet living, and able to give satisfaction to any that are curious in these points.

Now for the qualities of it, the most general and truest opinion is, that it is cold and dry. *Matthiolus* judgeth it to be hot for three special reasons. First, because it burns, and is a great fuel to fire. If this argument be good, then flax, and straw, and paper, and touch-wood, and spunck should be hot; for they are apt fuels to fire. Secondly, because it is, *odorata*, and he holds all *odorata*, to be *calida*: *Galen* is of another opinion, and holds the judgement of simples by savour to be uncertain. And as for Camphir, *Galen* knew it not. *Avicen* saith expressly of Camphir, that although it be *odorata*, yet it is *frigida*. And if *Matthiolus* his reason were good, then Roses and Violets, and Vinegar should be hot; for they are *odorata*. It is true that all savours arise from heat, as *Galen* saith, and all compounded bodies have some hot parts: but we speak of the predominancy in the subject, and of the operation it hath upon mans body. Thirdly, because it bites the tongue. So doth juice of Lemons, and Barberies, and Vinegar, &c. and yet they are cold. Wherefore I conclude our Camphir to be in quality cold and dry, and of very subtil

Comment. in Dioſc. l. 3. Tha Nemico.

De ſimpl. med. facult. l. 4. c. 22.

Lib. 1. tract. c. 2.

subtil parts. These *Bitumina* being unctuous and oily, dissolve not of themselves in water, without the help of some mineral juice, but may be confused with it. And we have many fountains and lakes which participate with them. In *Shropshire* at *Pitchford*, is a Spring that casteth forth Bitumen swimming upon the water. The like we read of in *Avernia* in *France*, between *Clarmond* and *Monferan*, where the people gather it for their uses. In *Italy* there are many fountains yielding Bitumen; at *Maianum*, and *Sassoli* and *Salsa*, and *Herculanum* at the foot of the Mountain *Vesuvium*, at *Baia*, and also at the cape of S. *Helena*, and in the Isle of *Woolfs* there are fountains of pitchie Bitumen, which are used to pitch ropes and tackling, as *Josephus Acosta* reports. And we have that famous lake *Asphaltites* in *Judea*, so full of Bitumen, that it hardly suffers any thing to sink in it. The River *Liparis* in *Cilicia*, by reason of a Spring near *Solos*, is so full of liquid Bitumen, as they which swim or wash in it, seem to be anointed with oyle. Also there are Bituminous Springs in *Saxony* at *Bruno*, in *Suevia* the lake *Tegera*, at *Gersedorf* under the mount *Jurat*, in *Asia* by *Tralleis* and *Nissa*. Also in the *West-Indies* there are many found which they put to use for shipping. And this Bitumen is the chief ingredient in our Baths at *Bathe* in *Somerset-shire*, although diluted with much Nitre, which makes the solution the better, and the water more clear. That Bitumen is predominant in these our Baths, may be proved by the effects, because we finde them exceedingly to comfort the nerves, supple the joynts, dry up rheumes, cure

Bellonius de Naphtha c. 7.

Agric. de nat. eor. quæ effluu. è terra l. 2. c. 7.

Bitumen predominant in the Bathes of *Bath.*

cure Palsies, and Contractions, being distinctly used, tinct silver into the colour of gold, &c. Also by the Bituminous savour of them, and by the neighbourhood of Cole-mines in those parts. All which do argue Bitumen to abound in them. And whereas Doctor *William Turner* in his treatise of these Baths, thinketh Brimstone to be the chief mineral, and Copper next; I am not of his opinion. The actual heat is no argument of Brimstone, as shall be shewed when I come to that point: neither doth the savour bewray it. But his reason for Copper is very weak. He found a Marchesit upon one of the Hills, which he thought to hold Copper: But Marchesits although they shew yellow, yet they seldom hold Copper, or any other Metal. But his discourse hath perswaded *John Bauhinus* to publish it confidently to the World. I shall have occasion to speak more of this hereafter. And thus much of *Bitumina*.

De thermis Boll. l. 3. c. 6 1.

CHAP.

CHAP. VII.

Of Mineral juyces concrete: called by the Alchymists, Salts. The four principal sorts of them; Salt, Nitre, Allum, Vitriol.

Libavius in Syntagm. p. 221

A Fourth sort of minerals are concrete juyces which are mineral substances dissoluble in water. These the Alchymists call Salts, and are the means of communicating all other minerals with water. For as water is apt to dissolve and extract vegetables, so are these concrete juyces apt to dissolve and extract mineral substances. And although they are found sometimes liquid being dissolved by moysture; yet we call them concrete, because they will be concrete when the adventitious moysture is removed. Our mineral Authors do make many sorts of these according to the several minerals which they imbibe: but in truth they may be all reduced to four heads; Salt, Nitre, Allum, and Vitriol. And each of these hath divers species, as *Geber* and *Cæsalpinus* say of Salt, *quot genera calcium, tot genera salium.* Concerning Vitriol there may be some doubt whether it be a distinct species from Allum, and have received only some tincture from Copper or Iron, or from some of their brood, which are called excrements. For in distilling oyle of Vitriol, the lute wherewith the glasses are joyned, will yield perfect Allum. And Vitriol being boyl'd, ariseth *in bullas* as Allum doth, and shoots like Allum *in glebas*; as Salt doth *in tesseras*, and Nitre *in stirias*. The shooting

ing or roching of concrete juyces, is worthy to be obſerved, ſeeing every kind hath his ſeveral manner or faſhion of ſhooting, whereby a man may ſee the perfection of each kind. For example, if Salt-peeter be brought you to examine whether it be perfect good or not, diſſolve it in water, and ſet it to ſhoot in a wooden-diſh, or with ſticks of Aſh, or other porous wood: and if it ſhoot in needles, (*in ſtirias*) it is right. But if any of it ſhoot in ſquares or angles, or lumps, it is mixt, and unfit either for Medicine or Gunpowder. The common Salt-peeter being prepared and cleanſed with aſhes, hath commonly much of the ſalt of the aſhes mixt with it in the liquors, which being brought to ſhoot, will ſettle firſt upon the wood in ſquares, (*in teſſeras*) and then the Salt-peeter will ſhoot upon it in needles. Theſe needles are good Salt-peeter, but the ſquares are other ſalt, and weaken the Salt-peeter in his operation; the like you may judge of other concrete juyces. There are alſo certain ſtones which we call *fluores*, which do naturally ſhoot in divers forms: as Chriſtal into ſix ſquares (*in ſexangulos.*) Sparr, which the Dutch call Sput or Querts, ſhoots into points like Diamonds, as we ſee in thoſe Corniſh or *Briſtol*-ſtones: *Oſteocolla* found by *Darmſtadt*, in the Palatinat, like bones: others like Oyſter or Muſcle-ſhells, &c. The reaſon of this ſeveral ſhooting in concrete juyces and other minerals, is hard to give. For if it did lye in the thinneſs or thickneſs, or clammineſs of the matter whereof they were made, that difference were taken away when divers ſorts are diſſolved together in the ſame wa-

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ter, for one would qualifie the other. But we find that this mixt water will yield his several salts distinctly, and all at once. So that it seems, for the ornament of the universe, that nature hath so distinguished these species, as it doth plants; among which some have thick leaves, some thin, some long, round, jagged, &c. some have bulbous-roots, some long, stringy, &c. So in their flowers, fruits, colours, smells, &c. every kind hath his own fashion. The reason hereof *Scaliger* saith cannot be drawn from the Elements, nor from the thinness, thickness, clamminess, heat, cold, dryness, moysture, plenty, scarsity, &c. of the matter, but only from the form, *anima*, seed, &c. which frames every species to his own figure, order, number, quantity, colour, taste, smell, &c. according to the science, as *Severinus* terms it, which every seed hath of his own form. So also it is in minerals, which have their several and distinct species in nature, and their seeds to maintain and perpetuate the Species. Now that these concrete juyces are not bred commonly in these forms in the earth, the reason may be, either because they are often intermixt with other minerals in their generation, or that their matter being plentiful, and room scanty, they have no scope to display themselves in their proper forms, or perhaps they want water to dissolve them. But by artificial preparations, we find these distinctions: in which it is doubtful whether heat or cold, or dryness, do procure this shooting or roching in concrete juyces, and whether the same causes procure it in all. For dryness it is certain that as moysture dissolves them, so dryness con-

In lib. de plantis Aristoteli ascriptum lib. 2. passim.

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geals them; but dryneſs being a paſſive quality, is not ſufficient; it muſt be the action either of heat or cold, or both; and the right ordering of theſe will open a door to the artifice of Bay-Salt here in *England*, as well as in *France* or *Spain*, or the Iſle of *Mayo*. Among theſe concrete juices, *Agricola* reckons Sulphur, Bitumen, Auripigmentum, Sandaracha, Chriſocola, Æruginem, Myſi, Sori, Melanteria, &c. But if we examine them aright, we ſhall find, that either they are not diſſoluble in water as concrete juices ſhould be, or they are ſome of thoſe juices tinctured or incorporated with other minerals. All theſe mineral juices are accounted hot and dry, and aſtringent, and detergent, ſome more, ſome leſs; and we take it ſo upon truſt. But this point requires further conſideration and diſtinction. *Cæſalpinus de metallisc. 3. l. 1.*

Salt is a fixed ſubſtance, not volatile in the fire, aſtringent, detergent, purging, diſperſing, repelling, attenuating, makes an eſcar, and preſerves from putrifaction, as *Dioſcorides* informs us, and *Galen* confirms the ſame, adding that it is hot. But we muſt underſtand *Galen* with his limitation, *lib. 6. cap. 30.* That the more it is deterſory, the leſs it is aſtringent. And all aſtringent things are cold, as he avoucheth, *lib. 4. cap. 6. Acida, acerba, & aſtringentia omnia frigida.* Now if Salt be aſtringent, it muſt be cold by *Galens* own rule, and it is not enough to ſay it hath warm parts in it, but being an uniform ſubſtance, we muſt determine of it *ex predominio*. Alſo *Galen lib. 1. Sympt. cap. 4.* comparing pure water with ſea water, ſeems, *Salt.* *Dioſc. l. 5. c. 84. De ſimpl. med. facult. l. 4. c. 20. & l. 11. c. 50.*

seems to affirm that sea water, before it have received any great adventitious cold, may cool our bodies. And so this place is understood by *Anthonius Maria Venustus in consilio pro Petro Picardo*, The repelling quality, and the making an escar, and the preserving from putrifaction, are arguments of driness, and not of heat. For as heat and moisture are principal agents in generation and corruption; so cold and driness in preservation. Also I should impute the purgative and detersory qualities in Salt rather to the tenuity of parts, and the stimulation which it hath from thence, then to any heat; for then as *Sennertus* saith, all hot things should purge, *Instit. lib. 5. part. 1. cap. 11. Valeriala in Gal. de constit, artis pag.* 447. And *Mesne Cau universal. cap.* 1. rejects all elementary qualities, temperaments, similitudes, or contrarieties of substances, &c. in purging medicines. Also Tamarinds, Myrabolans, and Antimony do purge, and yet are cold, *Venustus, pag.* 1[illegible] But the purgative faculty of Medicines is from stimulation of the expulsive faculty of the stomach and guts, and not from attraction by heat of peculiar humours, as hath been imagined. Heat may serve as an instrument to actual stimulation, as cold doth dull and benumb all faculties, but neither heat nor cold are principal agents in this work. And whereas Rhubarb is thought to purge choller only, Sena and Polipody melancholy, Agarick flegme, &c. because we see the excrements tincted with the same colours, it is a deceit; for these purgations do colour humours in that manner. Yet I do

not deny a distinction to be made of Purgations in other respects. And our antient Physitians through long experience have found out the right use of purging medicines, and their true distinctions for several uses for mens bodies: as that some do purge gross humours, and some thin, some are strong, and some weak: some are comfortable to the Stomach, or Liver, or Spleen, &c. and some hurtfull to some of those parts: some are too hot in some cases, and some temperate, &c. but they have not discovered the true cause of this purging quality: some attributing it to a celestial influence, some to a hidden quality, which is as much as if they had said nothing: some to a Sympathy, Antipathy, &c. For my part I hold the purgative quality of mixt bodies to lie principally in the terrestrial part of them, which is their Salt: and therefore the Chymists use to acuate their purging extracts with their proper Salts. It were much better if they could make their Salts without calcination; for then they should retain the taste of the Simples, which lyeth in the Salt, and much other virtue which the fire consumes in calcination. It were a delicate thing to have all our vegetable salts to retain the taste of the herbs and simples, from whence they are drawn: as of Wormwood, bitter; of Sorel, sour; of Licoris, sweet, &c. There are in mine opinion, three several wayes for it, although they be laborious. The one is by precipitation, when the juice or strong decoction of any simple is precipitated by the addition of some appropriate liquor which will strike down all other parts in the juice or decoction;

Three wayes to make Vegetable Salts to retain the taste of the herbs from whence they are drawn.

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ction; but the Salt which is in it will not eaſily precipitate, but will remain in the liquor, and muſt be ſevered either by evaporation, or by roching. But in this work we muſt make choice of ſuch a precipitator, as may not infect our
2. Salt with any ſtrange quality. Another way is to make an extract of the ſimple which we deſire to work upon, and when we have made it ſo dry as it will be powdred, then pour upon it pure ſpirit of Wine, which will diſſolve no Salt if it be without flegme. By this means through often repetitions of new infuſions, untill the extract will yield no more tincture unto the ſpirit of Wine, you ſhall find the Salt in the bottome, as a ſubſtance which the Spirit of Wine
3. will not work upon, nor diſſolve. A third way as I conceive, may be in manner of the working of Salt-Peeter, by putrifying great quantities of the herbs, untill they become earth: and then by infuſions with water, to extract the Salt, which will not putrifie with the herb, but will remain in the earth. The ſecond courſe I have tryed, the other wayes are very probable. In theſe ſalts do lie the chief virtues of many ſimples either for purging by ſtool, or urine, or for cleanſing, cooling, drying, ſtimulating, opening of obſtructions, attenuating of groſs humours, aſtriction, corroboration, &c. according to the nature of the ſimples: whereas the other Salts which are made by calcination, have loſt theſe virtues by the violence of fire, and cannot be diſtinguiſhed the one from the other.

Nitre. Nitre is a volatile ſubſtance which doth dry and

and attennate more then Salt, and although it hath not so much astriction as Salt is said to have, yet it seems to cool more then Salt, perhaps because it is of thinner parts, and penetrates more, and that is the reason that it serves better for the dissolution of Metals. In Physick we find our *Sal Nitrum* (which is a kind of it) to cool the body mightily, and therefore used in Juleps. These Nitres also are apt to move sweat, especially those that are drawn artificially from mixed bodies, as from Boles, Cordial Herbs, Bones, Horns, Teeth, Claws, Hoofs, &c. which are drawn by sublimation. And these parts of Animals are found to be very soveraign against venome and maligne humours. The reason of it I take to be, not only the drying quality they have, whereby they resist corruption of humours, but also & principally by reason of their volatile Salt or Nitre, whereby they move sweat, and expell from the center of the body. For all their Salt is volatile, as may appear by this, that you can never make any *lixivium*, out of any of these animal Medicines, by calcination, as you do out of vegetables; their Salt being altogether evaporated by the fire. This volatile salt being taken into our bodies, and actuated by our natural heat, is commonly very Diaphoretick: and this is it which makes our Bezoar Stones, *Contra-yerva*, *Ungula del Bado*, and supposed Unicorns Horn to be in such esteem.

Sal Ammoniacum, is also a kind of Nitre, and volatile, and so is Borax and Altincar: but these are commonly mixed with *Sal Alcali*, and Urin or Vinegar, and so made more fix. There is *Sal Ammoniack.*

also a natural *Fix Borax* found in the Isle of *Lambay* neer *Dublin* in *Ireland*, which perhaps the Sea water hath fixt. Allum and Vitriol are much alike, but that Vitriol hath a garb from Copper or Iron. These are very astringent, and without doubt cold, whatsoever hath been held of them. The waters or flegms distilled from them, do exceedingly cool in Juleps, as *Quercitan* and *Claudius Dariot*, have observed, and we also by daily experience do find true; by reason of the intense acidity they have, being distilled from their Terrestrial parts. Also those *Acidula* which the *Germans* call *Saurbrun*, proceeding from these Juices, are much used to quench the heat of fevers. It may be objected, that they are corrosives, and will eat into metal, and therefore must be hot. But by the same reason, the Juices of Lemons, Barberries, Howsleek, &c. should be hot, for they will carve Iron. To bite and eat as a Corrosive, are not arguments of heat, but of piercing. Wherefore *Hypocrates* saith, *Frigus ulceribus mordax*, Cold bites Ulcers; and *frigus est principium destructivum, ut calor generativum*; Cold is a destructive principle, and Heat a generative. And therefore it is more probable that these corrosives are more cold then hot. These two mineral juices are not so readily dissolved in water, as the other two, and wil be more easily precipitated by any opposite substance that is more familiar to water. I omit the several sorts of these concrete juices and their admixtures with other minerals, as impertinent to my purpose: wherefore I will shew some examples of each of them in natural Springs.

In peste Alexic. Dariot de præparat. med. Tract. 2. cap. 23, 24.

Lib. de Humidorum usu.

For

For salt Springs, *Josephus Acosta* tells us of a rare Spring at a Farm neer *Cusco* in *Peru*, which as it runs, turns into very white Salt, without any fire or art, in great abundance. In *Germany* are many salt Fountains, at *Luneburg*, *Stafford*, *Saltzburgh*, *Aldondorf*, *Halstat*, &c. In *Italy*, *in agro Volaterano*, &c. In *Sicily*, at *Solinantia*, is a salt Well which is hot; and so are the *Pegasai Fontes* in *Caria*. Also the Fountain by *Medon* in *Trasen* is both salt and hot. Our *Wiches* in *Cheshire* are well known. There are also Rivers of salt water by the *Caspian* Streights, and in *Spain*, and *Caria*, and in *Bactria*, *Ochus* and *Oxus*. Also there are salt Lakes, as the *Terentine* Lake in *Italy*, the Lake between *Strapela* and *Seburgh* (mentioned before) in *Germany*, three Lakes in *Sicily*, and besides an infinite number in other Countreys, the Lake of Lakes, the Sea. All which receive their saltness from Mines of Salt in the Earth, which are very frequent and huge in bigness, as may appear by the Rocks of Salt in *Bohemia*, in *Monte Carpato*, in *Polonia*, within two miles of *Cracovia*, in *Helvetia*, and *Rhetia*, where they have no other Salt but from the Rock. As also by the *Caspian* Streights, are great Rocks of Salt. But *Marcus Paulus Venetus*, tells us of a Rock or Mountain of Salt in *Thaican*, able to furnish all the world with Salt. So that it is no marvail that the Sea is salt, seeing it pierceth into the bowels of the earth, and discovereth many great Rocks of Salt which dissolve in it. And this is the true cause of the saltness of the Sea. The

Salt Springs.

Lib. 3.

The true cause of the saltness of the Sea.

other causes alledged for it, are very improbable. For whereas *Aristotle* and his followers attribute the saltnes of the Sea, to the evaporation of the fresh and sweet parts of the water, by the Sun, and to an aduſtion procured also thereby: I answer, that neither the one nor the other can breed a substance in the water, which was not there before. For qualities can breed no substance, and aduſtion is but a quality imprinted, and no substance. Neither can evaporation breed any, but only discover that which was in it before, by taking away the thin parts, and leaving the terrestrial behind. But we see the Sea water to contain in it the substance of Salt, and most of the Salt which we use is made of Sea water: and no man will deny that this Salt is differing from water in his substance and generation, being a distinct species in it self. And whereas they alledge for confirmation of their opinion, that under the torrid Zone, the Sea is more salt then in other parts, the Sun exhaling more there, and making a greater aduſtion; I doubt it, both for the large & plentiful Rivers which those parts afford, beyond any other parts of the world, and also for that the Sea water there is not hot, neither are the beams of the Sun so hot, but that men do endure them: and therefore not likely to breed an aduſtion in the Sea water, which must first be hot, before it be adusted. Also it may be that those parts do abound in Rocks of Salt, as we read of people in *Africa*, called *Ammanes*, who make them Houses of Rock-Salt, and Castles, as that in *Sinn Geraico*, which is five miles in compass, and all of Salt: also the

Aliquid aquæ admixtum Arist. 2. Meteorol. cap. 3.

the Mountain *Oromenus* in *India* is all of Salt. Moreover if the Sun be able to do this in the Sea, which is alwayes in motion, whereby it eludes the force of the beams; why should it not do the like, and much more in standing Lakes, as the *Lemanus* and such like? They answer that Lakes are continually supplyed and fed with fresh water from Springs. But so is the Sea continually fed with fresh water, and in as large a proportion, *ceteris paribus*, as Lakes are. For as the Sea is not increased by the influx of fresh waters, no more are divers Lakes, but keep the same fulness, and sometimes are lessened. And whereas they say that the upper part of the Sea is more salt then the botome, they speak against all reason, salt being heavier then water, and against experience, as I have shewed in the former Chapter. Also *Aristotle* in some places confesseth it. But if any man will take the pains to vapour away 100. Tun if he will of fresh water, I do assure my self he will not find one grain of salt at the bottome, if it were not in the water before. This may be tryed also in any distilled water, which we are sure can have no Salt in it, (for Salt will not arise in distillation) and is as apt to yield Salt as any other water, if adustion or evaporation would breed it. Wherefore the saltness of the Sea is not from evaporation or adustion, but must needs proceed from Rocks of Salt in the Earth, which the Sea doth wash, and dissolve much of it. And considering the great use of Salt, both for other uses, and for Generations, Nature hath provided enough of it, especially in the Sea, which is more fruitful in that respect,

Meteor. 2. c. 3.

the Land. Wherefore *Venus* was called Ἀναδυομένη: *Est Venus orta Mari.*

Nitrous Waters. Nitre is seldome found in Bathes alone, but mixt with other minerals, which it dissolves, and infects the water withall. Yet we read of a Nitrous Lake called *Letis*, neer *Cāleſtria* in *Macedonia*, where they use to make Nitre, and vent it to all parts. So they do at the *Nitraria* in *Egypt*. Also the Lake *Arethuſa* in *Armenia*, is full of Nitre. At *Menis* in *Phrygia* is a Spring of Nitrous water which is hot: Also in *Leonte* is a hot Nitrous Spring. *Bellonius* makes mention of a Nitrous Fountain neer *Belba*, and of abundance of Nitre upon a Plain neer thereunto, which seems to be that which *Pliny* calls *Halmariga*. But he denieth that there is any Mine of Nitre under the earth, but that all is bred out of the soyle as an *Efflorescens* of the earth: *Baccius* saith the same of Salt-peeter. *Agricola* saith, that as the true Nitre is gathered upon the Plains of *Media* above the earth, so is Salt-peeter found above the earth in many places of *Saxony*: That Nitre is gathered upon the Plains of *Media*, are *Plinies* own words. *Exiguum fit apud Medos canescentibus ſiccitate convallibus*; There is a little to be found among the Medes, where the Valleys are white with Drought. So that it seemeth, his opinion was, that Nitre is not bred in a Mine under the earth, as *Gesner* also saith, *Epiſt. lib. 3. pag.* 134. but in the earth it self, as the chief fatness it hath to further generations. And seeing earth is the mother of all terrestrial bodies, it is not left unfurnished with those mineral juices, nor ought else

Observat. l. 3. c. 76, 77.

Lib. 5. c. 7.

Lib. 31. c. 10.

else that is requisite for the production of Species: It hath been observed by some, that Nitrous water is the best soyle for ground, and brings all Plants to perfection far sooner then any other dung, and therefore the *Egyptians* water their Coleworts with Nitrous water,

Nitrosa viridis brassica fiet aqua. *Martial.*

If you a Colewort green would see,
Then let your water Nitrous be.

Our Salt-peeter men do find, that if any fat earth be covered from Rain and Sun, so as it spendeth not his strength in producing of Herbs or Grass, it will breed plenty of Salt-peeter, otherwise it will yield none. The difference between Salt-peeter, and the antient Nitre, appears in this, that a pound of Nitre being burnt, will leave four ounces of ashes; Salt-peeter will leave none. Salt-peeter is actually so cold, as being dissolved in water, it is used in *Rome* and *Naples* to cool their Wine, and doth it as well as Ice or Snow. Also we use it inwardly in cooling Juleps, and therefore it seems also to be potentially cold, as *Bellonius* judgeth.

Now I come to Allum (*Indignum vox ipsa jubet renovare dolorem*) the greatest debtor I have, and I the best benefactor to it, as shall appear when I shall think fit to publish the Artifice thereof. In *Illua*, a mile from *Rio*, is an Allum Fountain: also there are divers in *Agro Senensi*, *Volaterano*, *Lucensi*, in *Italy*: *Balneum de villa* is full of Allum; and with us in *Shropshire* *Allum Springs*

ſhire at *Okenyate*, are Allum ſprings, whereof the Dyers of *Shrewsbury* make uſe inſtead of Allum. As for Allum Mines, they are frequent almoſt in all Countreys, but the chiefeſt that are wrought, are at *Capſylar* in *Thracia*, at *Tolpha* neer *Civita Vecchia* in *Italy*, at *Commatow* by *Auſſig* in *Germany*, and with us in *York-ſhire*. In *Ireland* there have been allum works neer to *Armagh*, as *Thurneiſer* reports: alſo at *Metelia* in *Spain*, at *Mazaron* neer *Carthage*, at *Helleſpont*, *Maſſa*, *Montrond*, *Piombin*, *Volterra*, *Campiglia*, &c. as *Beringaccio Sieneſe* reports. Alſo there are divers earths yielding allum, as at *Guyder* in *Carnarvan-ſhire*, at *Camfart* in *Darſet-ſhire*, and in the Iſle of *Wight*. But I will contract my ſelf for allum, and come to Vitriol.

Pyrotech. l. 2. c. 6.

Vitriol, as I have ſaid before, doth participate much with allum in the manner of ſhooting and roching, which is *in glebas*, in the hard diſſolation and eaſie congelation, in their ariſing *in bullas* being burnt, and in their precipitation: inſomuch as it is probable that the baſis of Vitriol is nothing but allum. It is found in mineral waters of two ſorts. The one where the very body and ſubſtance is diſſolved; as in *Cyprus*, which *Galen* deſcribes, where the water is green: alſo at *Smolnicium* in *Hungary*, in *Tranſilvania* at *Carpatum montem*, at *Nenſola*, &c. In which places Copper is ordinarily made out of Iron by infuſing it in theſe waters. I will not determine whether this be tranſmutation of one ſpecies into another, as ſome do hold, or rather a precipitation of the Copper which was formerly diſſolved in the water by means of the ſharp Vitriol which

Vitrioline waters.

Simp. med. facul. l. 9. c. 61.

Libav. in Syntag. 3. part. l. 7. Item ſingularium part. 1.

which meeting with Iron, corrodes it, and imbibeth it, rather than the Copper, and so lets the Copper fall, and imbraceth the Iron in place of it. We daily see the like in *Aqua-fortis*, which having imbibed one metal, will readily embrace another that is more familiar to it, and let fall the first. So Allum or Copperas-water having some strong Lixivium of Tartar or other calcin'd salt put to it, the Allum or Copperas will presently fall to the bottom, and precipitate and give place to the Lixivium, as a thing more familiar to water, and of more easie dissolution. But as I said, I will not determine this question, because it is not much pertinent to our business. Yet I will not omit the judgement of *Lazarus Ercker* the Emperors chief Mine-master in the Kingdom of *Bohemia*, who professeth that he was long of this opinion, but altered it upon this reason; That by exact proof he found more Copper stricken down this way by Iron, than the water before did contain, and with the Copper some Silver. The other kind of Vitriol water is, where not the body and substance of Vitriol is dissolved, but the spirit or vapour, or quality communicated to the water: of this sort are our Vitriol Baths for the most part, and these are in themselves wholsome, and are sour, if the Vitriol be predominant. Such are most of our *Acidulæ*; whereof we have many in *Viterbio & Volaterano*, *Balneum ad morbum dictum*, *Saurbrun* by *Franckford ad Oderam*, &c. There are sour waters also from Allum, but milder: also from Sulphur, whose spirit or vapour being burnt, is little differing from the spirit of Vitriol, but somewhat fatter. But the most part

Lib. 3. Von. Kupfferertz.

Io. Baubinus de thermis l. 2. c. 2.

of

of our *Acidulæ* are from Vitriol. This sour spirit of Allum, Vitriol or Sulphur, *Libavius* judgeth with *Thomas Jordanus* to be, in the terrestrial parts of these minerals, because it goeth not away by boyling or distillation, and therefore to be communicated with water by the corporal substance or juyce of them. But that holds not in mineral spirits which are heavier than water, as may appear by evaporation of any water made sour with spirit of Vitriol or Sulphur, where after long evaporation, that which remains will be more sour than before evaporation. So it is also in Vinegar, being a vegetable juyce. The spirit of wine doth certainly arise first in distillation, and the first is the best, being more volatil than the vapour of water. But this *spiritus acetosus* which is in Sulphur, Allum, Vitriol and Vinegar, ariseth last; and the more you distill away from it, the sharper it ariseth, and the sourer is that which remaineth. Thus much for Vitriol and concrete juyces.

De judicio aqu. miner. p. 2. 6. 36.

CHAP.

CHAP. VIII.

Of Mineral Spirits; Quick-silver, Sulphur or Brimstone, Arsenick, with his kinds, Cadmia.

A Fist kind of Minerals are called Spirits; these are volatil in the fire, and have ingression into Metals, but no metalline fusion. These are Quick-silver, Sulphur, Arsenick, Cadmia, Rusma, &c. All which being volatil, will easily sublime, and being mixed with metals, as Cadmia's ordinarily to make Brass, will alter the colour of the metal, and make it less fusible, and less malleable. I will briefly run over the examples of these and their virtues or qualities, being more obscure, and in our Baths less useful than the former, and more rare.

Quick-silver was not well known to *Galen*, for he confesseth that he had no experience of it, and did think it to be meerly artificial, and not naturally bred in the earth. *Dioscorides* makes no mention of the temperature of it, but holds it to be a pernitious venome, and to fret the entrails; although *Matthiolus* affirms that it is safely given to women to further their deliverance, and we find it so by often experience, both in that cause, and in Worms, and in the French Disease and Leprosies, if it be skilfully prepared, and with judgement administred. *Fallopius* holds it to be one of the miracles of nature. Those that take upon them to determine of the qualities of it, are much distracted; some reckoning it to be hot and dry, and some cold and moist; and both in

Simpl. med. facult. l. 5. c. 59.

in a high degree. But in this account they consider not the qualities of the ingredients in the preparation; whether it be ſublim'd or precipitated. For my part I know not how to reduce it to the Elementary qualities: neither am I aſhamed of mine ignorance in it, ſeeing no man hitherto hath given true ſatisfaction herein. And if it be true that the elements do not concur to the generation of mixt bodies, (as I ſhall ſhew *cap.* 11.) we need not marvail if we find them not where they be not. But for our own uſe, when reaſon fails us, let us be guided by experience. We find by experience, that it cuts, attenuates, penetrates, melts, reſolves, purges both *ad centrum & a centro*, heats, cools, &c. and is a tranſcendent beyond our rules of Philoſophy, and a monſter in nature, as *Renodæus* ſaith. For our purpoſe it is enough to know whether it will impart any quality to water; which *Fallopius*, *Baccius*, *Solinander*, *Bauhinus*, and *Felix Platerus* do acknowledge. But it gives no taſte to it, neither have we many examples of Baths which contain it. In *Serra Morena* in *Spain*, near the Village *Almedien*, is a Cave where are many Wells infected (as is thought) with Quick-ſilver, becauſe much of that mineral is extracted from thence out of a red ſtone called *Minium nativum*. About fifty miles from thence in *Valentiola*, there is another fountain called *La Nava*, of a ſharp taſte, and held to proceed from Quick-ſilver, and theſe waters are found wholſome. So are the waters at *Almagra* and *Toletum*, and others by the River *Minius*, which are hot. There are many venomous ſprings attributed to Quick-ſilver,

Vidus Vidius curat. generat. p. 2. ſect. 2. l. 3. c. 13. Fallopius de metallis c. 37.

Quick-ſilver not reducible to the Elementary Qualities

the red fountain in *Æthiopia*, others in *Boetia*, *Cea* in *Trigloditis*, *Stix* in *Arcadia*, *Stix* in *Theſſalia*, *Licus* in *Sicilia*, &c. which perhaps are from other minerals, ſeeing we find ſome from Quick-ſilver to be wholſome. For Mines of Quick-ſilver, we read of many in *Bætica*, *Attica*, *Ionia*, out of a ſtone which *Pliny* calls *Vomica liquoris æterni*. In *Germany* at *Landsberg*, at *Creucenachum*, *Schenbach*, *Baraum* above *Prage*, *Kunningſtien*, &c. In *Scotland* three miles beyond *Barwick*, I found a red ſtone, which I took to be *minium nativum*, ſeeing *Agricola* makes mention of it in *Scotland*, but by a miſchance could not try it.

Sulphur attracts, contracts, reſolves, mollifies, diſcuſſes, whereby it ſhews a manifeſt heat, though not intenſe, yet the fume of it is very ſour, and therefore muſt cool and dry: and I perſwade my ſelf that there is no better fume to correct venomous and infectious air, than this of Sulphur, or to remove infections out of rooms, clothes, bedding, veſſels, &c. We muſt acknowledge differing parts in all compounded bodies; as Rhubarb hath a purgative quality in the infuſion, and an aſtrictive in the Terreſtrial ſubſtance, where the ſalt hath been by infuſion extracted. The ſubſtance of Sulphur is very fat (*Sulphure nihil pinguius*) ſaith *Felix Platerus*, and this is the cauſe of his eaſie taking of fire, and not any propinquity it hath with fire in the quality of heat: for if it were very hot, *Dioſcorides* would not commend it *purulenta extuſſientibus*, the next door to a Hectick. Alſo *Galen* ſaith, that fat things are moderately hot, and are rather nutri- Sulphur.

ments

ments than medicaments. Now for Sulphurous Baths, they are very frequent, and if we ſhould believe ſome, there are no hot Baths but participate with Sulphur, but they are deceived, as ſhall appear hereafter, when we come to ſhew the true cauſes of the heat of Baths. Neither are all ſulphurous Baths hot. *Geſner* reports of a Bath by *Zurich* very cold, and yet ſulphurous. *Agricola* of another by *Buda* in *Pannonia*. In *Campania* by the Leucogæan Hills, are cold Springs full of Brimſtone. Alſo there are hot Baths without any ſhew of ſulphur that can be diſcerned, as the Baths of *Petriolum* in *Italy*, the Baths *Caldanellæ* and *de Avinione in agro Senenſi*, *de Gratta in Viterbienſi*, *de aquis in piſanis collibus*, *Divi Johannis in agro Lucenſi*, *in Alſatia* another not far from *Geberſallerum*, &c. All which are very hot, and yet give no ſign of Sulphur either by taſte or ſmell, or effects. And yet no doubt there are many Baths having a ſulphurous ſmell from other minerals; as from Bitumen, Vitriol, Sandaracha, Allum, &c. which are hardly to be diſcerned (if at all) from Sulphur. So we commonly ſay, if a houſe or a tree be ſet on fire by lightning, that it ſmells of Brimſtone when there was no Brimſtone there. Many things combuſted, will yield a nidorous ſmell, not diſcernable after burning what the things were. But there are divers truly ſulphurous Baths which contain Sulphur, although not perfectly mixt with the water without ſome *medium*, but only confuſed: for perfect Sulphur will not diſſolve in water no more than Bitumen. The ſpirit of Sulphur may be communicated to

water,

water, and so may the matter of Sulphur before it hath attained his perfect form and consistence: otherwise it is only confused with water, and alters it into a milky colour. *Sulphurea Naralbus aqua*, Nar with Sulphurous water white. At *Baia* are divers hot sulphurous Baths, and every where in *Hetruria*, in *Sicily*, *in Diocesi Panormitana*; the Baths of *Apono*, as *Savanarola Montagnana*, and *Fallopius* avers, although *John de dondis* denieth it; the Bath of *Astrunum*, of *Callatura*, S. *Euphemie*, *Aquisgran*, *Brigenses thermæ in Valesiis Helvetiorum*, *Aqua sancta in Picenis*, and an infinite number every where. *Baccius* reckons our Baths of *Bath* among sulphurous Baths, from the relation of *Edward Carne* when he was Embassador to *Julius tertius*, and *Paulus quartus*. I will not deny some touch of Sulphur in them, seeing we find among bituminous coals, some which are called metal coals, with certain yellow vains which are Sulphur. But the proportion of Sulphur to Bitumen, is very little; and therefore I do not hold them Sulphurous *a prædominio*. This is enough for Sulphur.

Concerning Arsenick, it is a venomous mineral, and therefore I need speak nothing of the Baths which proceed from it, but that we take heed of them; It is likely that those venomous waters and vapours which kill suddenly, do proceed from Arsenick, as at *Cicrum* in *Thracia*, *fons Neptunius in Terracina*, at *Peraut* by *Mompelier*, *the Lake Avernus*. *The cave of Charon by Naples*. Under Arsenick we may comprehend *Auripigmentum*, *Risagalum*, *Sandaracha*, *Rus-* Arsenick.

ma, &c. I hear of but one Mine of *Ruſma* in *Ciprus*, from whence the Turks have it to take off hair, and it doth it beſt of any thing known, as *Bellonius* and *Platerus* report, and I have made tryal of it oftentimes: The former ſorts of Arſenick are found in *Miſia Helleſpontia in Ponto*, by the River *Hippanis*, which is made bitter by it. In the leſſer *Aſia*, between *Magneſia* and *Epheſus* in *Carmania*, &c. It is accounted to be extreme hot and putrifying.

Cadmia. *Cadmia* is either natural or fictitious: The natural is often dangerous in *Germany*, as *Agricola* ſaith, eſpecially that which is liquid, which is a ſtrong corroſive: the other is of the nature of Copper, moderately hot and cleanſing; and eſpecially good to clear the eyes, as *Calamine* and *Tutia*. It is found in Copper Mines, and of it ſelf in *Ciprus*, as *Galen* ſaith by the City *Sal*. Alſo in *Agro Senenſi*, *Vicentino*, *Bergomenſi*, near *Como*, where they make Braſs with it. Under *Mendip* hills there is much of it. The Baths of Saint *Caſſian* do participate with it, and *Cicero* his Baths neer *Baia*. Alſo the Bath at *Zurich* in *Helvetia*, and *Grotta* in *Viterbio*.

Thus much for Spirits.

CHA

CHAP. IX.

Of mean metals, or half metals. Biſmutum or Tin-glaſs, Antimony, Bell-metal.

A Sixt ſort I make to be mean metals, or half metals, which are mineral ſubſtances, having metalline fuſion, but are not malleable as metals are: and therefore being mixt with metals, do make them brittle. Theſe are *Biſmutum*, or *plumbum cinereum*, Antimony, Bell-metal, which *Geber* calls *Magneſia*, in Dutch *Speiſſ*. *Calaem* alſo may be reckoned among thoſe, which is a kind of white metalline *Cadmia*, brought out of the *Eaſt-Indies*, which hath both metalline ingreſſion, and metalline fuſion, but not perfectly malleable. Theſe although they are more volatil than metal, yet by reaſon of their fuſion into a King, are not ſo eaſily ſublim'd as the Spirits.

Biſmutum is that we call Tin-glaſs, differing both from Tin and Lead. *Candidius nigro, ſed plumbo nigrius albo*, whiter than black, but blacker than white lead. It was not known to the Antients, and therefore we can ſay little of the qualities of it. It is found in *England*, and in *Miſnia*, and at *Sneberg* in *Germany*, and in very few places elſe. I read not of any waters that participate with it: neither can I ſay much of Antimony, but that *Dioſcorides* ſaith it cools, binds, opens obſtructions, &c. And *Galen*, that it dryeth and bindeth, and is good for the eyes, &c. But of the purging quality they write nothing, although we find it to purge violently, both upwards:

Biſmutum, or Tin-glaſs.

wards and downwards: whereupon we may ga-
ther that all purging medicines are not hot, as
have touched before. *Cambden* saith there is
Mine of it in *Cumberland*: It is found in *Ita-*
in Thiuni montibus, in Senensi agro in the Cou-
ty of S. *Flora*, and in *Germany* in many place
But I read of no waters that participate with
unless we should judge all purgative waters to
infected with it; as neer *Ormus*, *Purchas* wri
of such a Spring which purgeth. *Savanarola*
Part.3.pag.72. *Balneis Romandiolæ*, mentions a Spring at *M*
dula, which purgeth. Also *Balneum Tertuii*
agro Pistorienſi, *Fallopio*; also the four wa
of *Mendich* and *Ponterbon* do purge choler,
Rulandus saith. At *None-such* we have also a p
gative Spring, which may participate with
timony or Nitre, or both: But purgative wa
are rare, unless it be *ratione ponderis*, by the we
and quantity, and so any water may purge,
our *Bath*-waters do purge in that manner, and
the addition of Salt, which gives stimulation
it. This our *Bath*-guides do ordinarily presc
to such as will be perswaded by them, not kn
ing how it agreeth with their griefs, nor ho
may do hurt in many respects, as oftentime
doth.

Bell-metal is thought to be a mixture of
and Copper-Oars, as *Kentman* judgeth, an
found in our Tin and Copper-Mines in *C*
wall. I read of no waters infected with it, n
any use it hath in Physick.

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CHAP. X.

Of Metals; Gold, Silver, Iron, Copper, Tin, Lead.

THe ſeventh and laſt ſort are metals, mineral ſubſtances, fuſible and malleable. Theſe are commonly diſtinguiſhed into perfect and imperfect; perfect, becauſe they have leſs impurity or heterogenity in them, as Gold and Silver. The reſt are called imperfect, becauſe they are full of impurities, and they are either hard or ſoft. Hard, as thoſe which will indure ignition before they melt, as Iron and Copper: Soft, which will not, but melt at the firſt, as Tin and Lead. *Fallop. de metallis cap.* 10. *Libav. de nat. metall. part.* 3. *cap.* 5.

All theſe metals are found in His Majeſties Dominions, and many of them I perſwade my ſelf, might be wrought to better profit, if our Smelters were skilful, or were not hindred by ſiniſter reſpects. But eſpecially we abound in the imperfect metals more than enough to ſerve our own uſe. And for the perfect metals, I have ſeen both in *Cornewall* and at *Crayfordmuir* in *Scotland*, perfect Gold (which the Dutch call *Gediegen*) in grains among Sparr. Alſo among other metals, it is ordinarily bred, as Iron and Copper, and Tin. But from Tin it is hardly ſeparated without more waſte of Tin than the Gold is worth. From Iron and Copper I ſee no reaſon but it might be ſeparated with advantage. Gold.

For ſilver, there is much loſt for want of taking it forth of Lead-Oars: for whereas thoſe Oars which are rich in ſilver, are commonly hard of Silver.

fusion; our mineral men either neglect those Oars, and work them not, or else they mix some small proportion of them with their poor Oars which are easie of fusion, and so make the metal so poor, as it is not worth the refining. Whereas if they were wrought by themselves, they would yield in silver upon every Tun, some 20 ounces, some 40, some 60, some 80, more or less.

Copper. For Copper, whereas we fetch our Pins and Tags of Points from other Countreys, yet no doubt we might be furnished of our own, both for these and other uses. We have but one Copper work that I hear of in all his Majesties Dominions, and that is at *Keswick* in *Cumberland*, but Copper Mines are found in divers other parts as in *Cornwall* at *Trevascus*, and other places in *York-shire*, *Scotland*, *Ireland*, &c. And no doubt many are concealed, by reason they are Mines Royal. If these were wrought, and wrought after a good manner, it is likely they would bring a good advantage to his Majesty, and to the Kingdom.

Iron. For Iron, we have the Oar in abundance, but it is pity that so much good wood should be wasted upon it for so bad iron; and yet the gain which it holds, is lost. Many have propounded the melting of it with stone-coal, but perhaps they have failed in their projects: yet this doth not prove the impossibility of it. And for the goodness of this metal, if it were rightly made, it would melt as readily as other metal, and would be tough, and not so brittle as it is, and would not be so apt to rust. For these inconveniences

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happen to it for want of ſeparation of the impurities which are bred with it.

For Tin, we have as good as any in the World, although it is not wrought to the beſt advantage. The Countreys where it grows, are barren of wood, and they are fain to fetch it far off. Now if it were wrought, as I know it may, by many experiments which I have made upon it, with ſtone-coal, there would be much ſaved, and the wood might be otherwiſe employed. The Tin alſo would be as good as now it is, and the product not diminiſhed. Tin.

For Lead, although for ſoft Oars the ordinary courſe of melting at *Mendip* and the *Peak*, may ſerve well, and much better than their Baling at *Aldendale* in *Hexamſhire*, and at *Graſs* in the Biſhoprick of *Dureſme*: yet for hard Oars (which are commonly rich in ſilver) there might be better courſes taken, by common or proper Agents. Common agents are fire and water; proper are diſſolvents or additaments. By fire they might amend their working, if they did roaſt their Oars well before melting, to breath away volatil and combuſtible ſubſtances which are mixed with their Oars. By water, after calcination or roaſting, they may ſeparate all diſſoluble juyces, &c. Lead.

Diſſolvents do chiefly ſerve to ſeparate the ſilver or gold out of the Oars: as in the quick-ſilver work, or by Lyes of Nitre, Allum, Salts, &c.

Additaments are alſo of great uſe, whether they be ſegregatory for ſeparation of ſpirits, or mean metals from our Oars, and ſo to facilitate their

their fusion: or propugnatory to defend the Oares from consuming or vitrifying. Segregatory additaments are either such as are more easie of fusion than the Oare, and so draw the Oare into fusion with them, or such as will not melt at all, as *Geber* saith, *Cujus intentio non sit fundi*; which keeps the Oar asunder from clodding, and gives it a greater heat, like fire in his bosom. By these means well applyed and used, all Lead Oares might be wrought, be they never so stubborn, and none need to be neglected. Hitherto I have digressed out of mine intended course, through the desire I have to advance mineral works. Now I will return to shew the nature and qualities of these metals, as I have done of other minerals.

Nature and qualities of Gold.

Gold of all Metals is the most solid, and therefore the most heavy, as having few impurities or heterogeneal substances mixed with it. And therefore it is not subject to corruption, as other metals are, neither will it lose any of his substance, either by fire or water, although it should be held in them a long time: so as it is an idle and vain perswasion that many have, who think by boyling Gold in Broth, to get some strength from thence, and so to make the Broths more cordial. The like I may say of putting Gold into Electuaries or Pills, unless it be in case of Quicksilver taken into the body, which the Gold by touch may gather to it, otherwise it goes out of the body as it came in, without any concoction or alteration, or diminution. And if it be dissolved in strong water, it will be reduced again to his metalline substance, without diminution,

Baccius lib. 6. cap. 8.

tion, much less will it be dissolved without corrosive Spirits, to make *Aurum Potabile*, as some do undertake. *Crollius* doth acknowledge, that there is but one *Menstruum* in the world that may do it, and that he knows not. But if we had it dissolved, we are yet uncertain what the quality of it would be, or what use to make of it in Physick; only because it loseth none of his substance, we know it can do no hurt, and therefore we use it for Cauteries, & to quench in Beer or Wine, &c. to warm it, or to give it some astriction from the fire. *Fallopius* in these regards disclaims it in all mineral waters, as he doth all other metals: and will not believe that any metal doth impart any quality unto water. *Claudinus* holds otherwise, and so doth *Baccius*, *Savanarola*, *Montagnana*, *Venustus*, *Solinander*, and almost all that have written of Bathes. For if we should exclude Metals, we must likewise exclude Stones, and Bitumina and Sulphur, and almost all minerals, except concrete juices. For none of these, after they have attained to their full consistence, will of themselves dissolve in water, without the help of some concrete juice, as a medium to unite them with the water. But before they have their full consistence, whilst they are in *Solutis principiis*, as Earth, Juice, or Vapour, they may be communicated with water. Gold is so sparingly bred in the bowels of the Earth, as in that respect it can hardly furnish a perpetual Spring with any quality from it; yet some Bathes are held to participate with Gold, as *Ficuncellenses*, *Fabariæ*, *Piperinæ*, *de Grotta in Viterbio*: *Sancti Cassiani de Buxo*, *&c.*

Basilica chimia pag. 204.

De Thermis cap. 8.

In ingressu ad infermo., pag. 373.

Silver

Of Silver.] Silver comes next in purity to Gold, but is inferiour unto it, as appears by the diſſolution of it, and by the blew tincture which it yields, and by the fouling of the fingers, &c. For the qualities of it, there is not much diſcovered. But as all other things of price are ſuperſtitiouſly accounted cordial, ſo is this, eſpecially in hot and moiſt diſtempers of the heart: for it is eſteemed to be cold, and dry, and aſtringent, and yet emollient. We have no Bathes which do manifeſtly participate with it: perhaps, by reaſon, nature doth not produce it in ſufficient quantity to infect waters. *John Baubinus* thinks there may be Silver in the Bathes at *Boll*: becauſe he ſaith there was a Pyritis or Marcheſit examined by Doctor *Cadner*, and out of fifty pound weight of it, he drew two drams of Silver: a very ſmall proportion to ground his opinion upon.

Theod Tabernomontanus, p. 2. cap. 8.

Of Iron and Steel. Iron is the moſt impure of all metals, as we have it wrought, and will hardly melt as metals ſhould do, but with additaments and fluſſes. Neither is it ſo malleable, and ductible as other metals are, by reaſon of his many impurities. Yet we ſee that at *Damaſco* they work and refine it in ſuch ſort, as it will melt at a Lamp, and is ſo tough, as it will hardly break. And this is not by reaſon of any ſpecial Mine differing from other Iron Mines, for they have no Mines of Iron near to *Damaſcus*, as *Bellonius* reports, but have it brought thither from divers other places, only their art in working and purifying it is beyond ours. So the Spaniſh Steel and Iron is purer then ours, and we do eſteem of *Bilbo-*

Bilbo-blades beyond others, which are quenched in the River *Bilbilis*: as *Turnus* his Sword in *Virgil* was quenched in the River *Styx*.

Enſem quem Dauno ignipotens Deus ipſe parenti Fecerat, & Stygia candentem extinxerat unda. *Æntad* 12.

A Sword the god of fire, of his own make,
Gave Daune, Turn's Father, quench'd in Stygian Lake.

But the hardning of Steel lyeth not in this point; other waters no doubt may ſerve as well. But I perſwade my ſelf that our Iron may be made much purer, and perhaps ſome Gold extracted from it which it holds.

Concerning the temperature of Iron and Steel, *Galen* reckons it among earth, and therefore it muſt be cold. *Manardus* is abſolutely of that opinion, and ſo are moſt of our Phyſitians. Only *Fallopius* holds it to be hot, becauſe *Scribonius Largus* preſcribes it in Ulcers of the Bladder, which it doth cure, not in regard of heating, but drying; for it dryeth and bindeth much, and therefore by *Galens* rule it muſt be cold. *Aſtringentia omnia frigida*; all binding things are cold. I have obſerved in Iron and Steel two diſtinct qualities, the one opening, or deopilative; the other aſtringent. The opening quality lyeth in a volatile Salt or Nitre, which it is full of, the aſtringent quality in the Crocus, or Terreſtrial part. Theſe two ſubſtances are thus diſcerned and ſevered. Take of the ſylings of Steel or Iron, and caſt it into the flame of a Candle, *Simpl. lib. 9.* *Libs 16. Epiſt. 5. De metallis cap. 20.* *Simpl. l. 7. c. 4.* Two diſtinct qualities in Steel.

Candle, and you shall see it to burn like Salt-peeter or Rosin. Take these fylings, and infuse them three or four times in Water or Wine, as we use to make our Chalibeat Wines, till the water or wine have dissolved all this Salt, and then dry it and cast it into the flame, and it shall not burn, but the liquor will have a strong taste from this Salt. And this is it which opens obstructions. The astringent quality lyeth in the terrestrial substance, as is evident, after either, by infusions, or by calcination, the volatile salt is departed from it, that which remains, is very astringent, and stayeth all manner of fluxes, &c.

Concerning Bathes participating with Iron, we have too many examples of them for *Fallopius* to contradict. We may let him injoy his opinion of the *Calderiana*, *Veronensia & Villensia Lucensia*, although it be against the judgement of all other who have written of them, and it is hard for him to be confident in a negative. We have examples more then enough to prove the quality of Iron in our mineral waters. *Balneum Reginæ in agro Pisano* is actually hot, and from Iron. So is *Balneum Sancti Cassiani in agro Senensi*: So is *Balneum Ficuncellæ, de Russellis, Bora in agro Florent. Brandulæ in agro Regiensi, Visicatoriæ in Tuscia, Isenbrun* by *Liege, Forgense* in *Normandy*: the *Spaw-water, Tunbridge-water, Bristol-water* by S. *Vincents* Rock: all which, some being hot, and some cold, participate with Iron, as may be proved, not only by the consent of all writers, which have made mention of them, but by the Mines from whence they come, or by their taste, or by their virtues.

Solinander, pag. 193. Venustus, pag. 159. Baccius lib. 6. cap. 3. Savonarola. Renodæus pag. 305.

Copper

Copper comes neareſt to the nature of Iron, but is more pure, and more eaſie of fuſion, and will be almoſt all converted into Vitriol. They are convertible the one into the other, as I have ſhewed out of *Erker*, in Vitriol. And by the practice at *Commataw* and *Smolnicium*: The like alſo hath been ſhewed in *Cornwall*, at the Confluence by Maſter *Ruſſel*. *Ariſtotle* alſo tells of a Copper Mine in *Thalia*, an Iſland of the *Tyrrhen* Sea, which being wrought out, turned into an Iron Mine: in this ſimilitude of nature, we cannot but judge that there is a ſimilitude in qualities, and that Iron being cold, Copper cannot be hot. Temperate it may be, becauſe leſs aſtringent then Iron, and more cleanſing: *Rhaſis* ſaith that it purgeth like a Cathartícum, aud in his continent, preſcibes it to purge water in Dropſies. Another argument that all purgatives are not hot: it dryeth exceedingly, and attenuates and digeſts. We have divers waters which participate with it, which if they be pure from Copper it ſelf, are very ſafe and wholſome: but if they be foul, and proceed from the excrements of Copper, they are not wholſome to drink. *Balnea Colſenſia ſeu ferina in Martiana Silva*, do conſiſt in Copper and Allum. The Bath of *Faberia* in *Rhetia*, of Copper and Gold. *Aqua de Grotta in agro Viterbienſi*, is full of Copper; ſo is *Aqua Faſtelli*, *Balneum Lucenſe in Valeſiis*: *Marcus Paulus Venetus*, tells us of a greeniſh Fountain in *Perſia*, which purgeth exceedingly, and is held to come from Copper. Quality of Copper. *Libav. de nat. metall. c.* 10.

Tin and Lead are two of our Staple Commodities Of Tin.

dities which our Countrey yields plentifully, not only for our own use, but to supply other Nations. Tin is bred in *Cornwall*, and part of *Devonshire*, and in the Isles of *Scilly*, which from thence were called *Cassiterides*. It is melted out of little black stones, which the Dutch call *Zwitter*, with great charge, because they cannot melt it, but with wood coals, which is brought them far off, and they are fain to run it over two or three times, before they can get out all the Tin, and yet much of it is wasted in the blast. I doubt not but it might be done with Sea-coal, if they knew the Artifice, and with as great a product of Tin. There is both Silver and Gold found in it, but without wasting of the Tin, we know no means to sever it. It is in quality cold and dry, and yet moves sweat abundantly, as I have proved.

Of Lead. Lead is melted commonly out of an Oar common to Silver and Lead, as *Pliny* saith called *Galena*. And although *Agricola* saith of the villachar Lead, that it holds no Silver, and therefore fittest for assayes; yet *Lazarus Erker* contradicts it out of his own experience. Our Countrey abounds with it every where, especially at the Peak in *Darbishire*, and at *Mendip* in *Somersetshire*; *Wales* also and *Cornwall*, and *Devon*, are full of it, and so is *Yorkshire* and *Cumberland*. The qualities of it are cold and dry. But for these two metals, we find no waters which are infected with them. In *Lorain*, they have Bathes called *Plumbaria*, which some think by reason of the name, to proceed from Lead: but *John Bauhinus* thinks they should be called

Pag. 90.

called *Plumiers*, as *Pictorius* writes it from the French word *Plumer, a deplumando*, because they are so hot as they use to scald fowls in them, to take off their feathers.

Thus much for metals, and all other sorts of Minerals, with their several Natures and Baths infected with any of them. As for mixed bodies, and flores, and recrements, &c. they are to be referred to the simple bodies from whence they proceed: As *Tutia, Pompholix, Minium, Cerussa, Sublimatum, Præcipitatum, &c.*

CHAP. XI.

Of the generation of Metals in the Earth; Their seminary Spirit, That it is not from the Elements.

NOw I must shew the generation of these minerals in the bowels of the earth, which of necessity we must understand, before we can shew the reasons how mineral waters receive either their actual heat, or their virtues. *Fallop. de metallis cap.* 11. *Libav. de nat. metal. cap.* 12.

Some have imagined that metals and minerals were created perfect at the first, seeing there appears not any seed of them manifestly, as doth of Animals and Vegetables; and seeing their substances are not so fluxible, but more firm and permanent. But as they are subject to corruption in time, by reason of many impurities, and differing parts in them, so they had need to be repaired by generation.

It

It appears in *Geneſis*, that Plants were not created perfect at firſt, but only in their Seminaries: for *Moſes Cap.* 2. gives a reaſon why Plants were not come forth of the earth, *ſcil.* becauſe (as *Tremelius* tranſlates it) there had as yet neither any rain fallen, nor any dew aſcended from the earth, whereby they might be produced and nouriſhed: The like we may judge of minerals, that they were not at firſt created perfect, but diſpoſed of in ſuch ſort, as they ſhould perpetuate themſelves in their ſeveral kinds. Wherefore it hath ever been a received *Axiome* among the beſt Philoſophers, that minerals are generated, and experience hath confirmed it in all kinds. Our Salt-peeter men find that when they have extracted Salt-peeter out of a floor of earth one year, within three or four years after, they find more Salt-peeter generated there, and do work it over again. The like is obſerved in Allum and Copperaſs.

Agricola de ortu & cauſis Subt. lib. 5. *c.* 1.

As for metals, our Tinners in *Cornewall* have experience of Pits which have been filled up with earth after they have wrought out all the Tin they could find in them; and within thirty years they have opened them again, and found more Tin generated. The like hath been obſerved in Iron, as *Gaudentius Merula* reports of *Ilva*, an Iſland in the Adriatick Sea, under the Venetians, where the Iron breeds continually as faſt as they can work it, which is confirmed alſo by *Agricola* and *Baccius*; and by *Virgil*, who ſaith of it,

Lib. 3. *c.* 19.

Æn. lib. 10.

Inſula

Insula inexhaustis Chalybum generosa metallis;

Brave *Ilva* Isle, whose teeming womb,
Breeds Iron till the day of Doom.

The like we read of at *Saga* in *Lygiis*, where they dig over their Iron-mines every tenth year. *John Matthesius* gives us examples almost of all sorts of minerals and metals which he hath observed to grow and regenerate. The like examples you may find in *Leonardus Thurneisserus*. *Erastus* affirms that he did see in S. *Joachims* dale, silver grown upon a beam of wood, which was placed in the pit to support the works: and when it was rotten, the workmen coming to set new timber in the place, found the silver sticking to the old beam. Also he reports that in *Germany*, there hath been unripe and unconcocted silver found in Mines, which the best workmen affirmed, would become perfect silver in thirty years. The *like Modestinus Facbius*, and *Matthesius* affirm of unripe and liquid silver; which when the workmen find, they use to say, *We are come too soon*. But I need not produce any more proofs for this purpose, as I could out of *Agricola* and *Libavius*, and others, seeing our best Philosophers, both antient and modern, do acknowledge that all minerals are generated. The manner of generation of minerals and metals, is the same in all, as is agreed upon both by *Plato* and *Aristotle*, and *Theophrastus*.

In Saxept. concil. 3. 11. &c.

In Alchimia magna. De metallis pag. 17. & 19.

Von probierung der ertze. In Saxonia.

Sebast. Foxius l. 3. c. 6. Severinus c. 8. p. 125.

And as the manner of generation of minerals is alike in all, so it differs from the generation of

animate bodies, whether animals or vegetables, in this, that having no seed, they have no power or instinct of producing other individuals, but have their species perpetuated *per virtutem seu spiritum semini analogum*, by a spiritual substance proportionable to seed, which is not resident in every individual, as it is in animals and plants, which *Moses* saith have their seeds in themselves, but in their proper wombs. This is the judgement of *Petrus Severinus*, howsoever he doth obscure it by his Platonical grandiloquence. And as there is not *Vacuum in Corporibus*, so much less in *Speciebus*: For that the Species are perpetuated by new generations, is most certain, and proved before: that it is not out of the seeds of individuals, is evident by this, that if minerals do not assimulate nourishment by attraction, retention, concoction, expulsion, &c. for the maintenance of their own individual bodies, much less are they able to breed a superfluity of nourishment for seed. And how can they attract and concoct nourishment, and expel excrements, which have no veins nor fibres, nor any distinct parts to perform these Offices withal? Moreover they are not increased as Plants are, by nourishment, whereas the parts already generated, are extended in all proportions by the ingression of nutriment, which fills and enlarges them: but only are augmented externally upon the superficies, by super-addition of new matter concocted by the same virtue and spirit, into the same Species.

Cæsalpinus de metal. lib. 1. c. 2.

Cap. 2.

Erast. disput. part. 2. p. 261.

Thus much for the manner of all mineral generations, which is not much controverted: the chief

chief difference is about the efficient and the matter. About the efficient cauſe of generations (for we muſt handle them all together) there are divers opinions, as there are divers cauſes which concur to all generations of animals, vegetables or minerals. But there muſt be one principal efficient cauſe, to give the form to all Species, as there are other adjuvant and attending cauſes: The principal cauſe and agent in this work, is by moſt attributed to the influence of the Planets, eſpecially to the Sun, who either by his light, or by his heat, doth frame the ſpecies of all things, and ſo of minerals, but chiefly in regard of his heat. This heat working upon apt matter, is thought to produce the ſeveral ſpecies which we ſee. As for the motion of the Planets, it is certain that they move continually in a conſtant order, and the World could not ſubſiſt as it doth without it · ſo as it may be *cauſa ſine qua non*; a very remote cauſe, as there may be a hundred more cauſes of that nature. So likewiſe the light, which the Peripateticks make the inſtrument of cœleſtial effects, can do as little to the furtherance of generations, ſeeing they proceed as well by night as by day: and for minerals, it is perpetual night with them, the denſity of the earth and rocks not ſuffering the light to paſs. Wherefore they inſiſt chiefly upon the heat of the Sun: but *Moſes* tells us that Plants were created with their ſeeds in themſelves upon the third day, before the Planets, which were not created till the fourth day; to ſhew us that Plants and terreſtrial ſubſtances depend not upon Planets for their generations, nor for their virtues, but have the principal

The principal Efficient Cauſe of the Generation of Minerals, not the Sun.

Dorn. phiſica Genebſis.

cipal causes of them in themselves. The same we may judge of minerals, being terrestrial substances, and propagated by seeds, as Plants are, and likely to be created upon the same day with Plants, seeing there is no other mention of their creation in *Moses*.

Now for the heat of the Sun, no doubt it is an universal fosterer of all inferior substances: but that it should beget particular Species, is very improbable. The heat of the Sun is no more apt to breed a Nettle than a Dock, Brimstone than Salt, &c. For it cannot give the essence to any thing; heat being only a quality which can breed no substance, and such a quality as can only segregate heterogeneal substances, and thereby congregate homogeneal. Whereas in all generations there must be a further power and virtue, to proportion the Elements fit for every Species (if they will have all things made of the Elements) and to bring the Species from a potential being to an actual, giving to every thing his proper shape, quantity, colour, smell, taste, &c. and to unite them, which before were of different natures: It must be an internal and domestical agent, and efficient cause which must perform this: and such a one as is not common to all Species alike, but proper to that which it produceth: otherwise there would be no distinction of Species. And therefore *Moses* saith of Plants, that they have their seeds in themselves, according to their several kinds. Neither can any external cause give an essential form to any thing, which form must be ἐνσφυής, inbred in the thing it self, and not adventitious. And therefore *Scaliger*

Gal. de Mar.

liger saith, *Formæ, non Solis est quantitatem terminare*, and *Aristotle*, *Calore naturæ utitur tanquam ministro aut instrumento, non tanquam opifice aut legislatore.* Wherefore we will grant the Sun to be an adjuvant cause, and by his heat to foster and cherish inferiour generations: but not to be a principal and begetting cause. And so *Zabarella* doth mollifie the harshness of the former opinion: and doth acknowledge that the Sun doth further generations only as an instrument of another superiour power, whereby in minerals it may make the matter more apt to receive the form, but it makes no minerals, no more then it makes blood in our bodies. *De calore.*

Others make the Elements to be the principal causes of all species by their qualities. For the matter of the Elements, being a passive matter, cannot be an efficient cause of generations. These qualities must be heat or cold: for the other two are passive, and attend rather upon the matter of generations, then upon the efficient. Fire therefore by his heat is thought of all the Elements to have the greatest hand in all generations, being most active and superiour to all the rest of the Elements together, for the generation of every Species, and rank them in due order, proportion, weight, measure, &c. This is he than must reconcile the differences which are in their natures, and bring them to union. This must attract nourishment, and prescribe the quantities, dimensions, parts, figures, colours, tastes, savours, &c. of every thing. A large Province he hath to govern, with one naked and simple quality, which can have but one Neither the Elements.

simple motion. *Simplicibus corporibus simpliciter tantum motus congruunt.* Heat can but heat, and the effects of this heat are by separation of different substances, περὶ ἀλλοφύλων to congregate those that are alike, τὰ ὁμόφυλα: But in this work we make heat to unite differing substances: for all generation is of differing substances united into one. Again, fire having but one quality to work withall, whereby he must unite the other three Elements, what shall bring and unite fire unto them? This must be another power superiour to them all, for we must not imagine that they meet by chance as travellers do. And therefore *Aristotle* explodes this efficient of fire, and attributes it to the forms of natural things.

1 *De anima Item* 2. *cap.* 4.

As for cold in the other Elements, it is far more unlikely then heat, to perform these offices, being rather a destructive, then a generative quality, and is not called in by any Author to this work, before the species have received his form by heat: and then it is admitted only for consolidation, but how justly, it is doubtfull: for heat doth consolidate as well as cold, by drying up moisture. But we will not grant this to either of them, as principal Agents, but as they are instruments attending the forms of natural things.

The Alchymists make Sulphur to be the principal efficient of all minerals, especially of metals, and Mercury the matter. If they mean common Sulphur and Mercury, which are perfect Species in their kinds, they are much deceived, and this opinion is sufficiently confuted by all that oppugne them. But it seems they

they understand some parts in the seminary of metals which have some analogy with these: and so their opinion may be allowed. For the spirit, which is the efficient in these generations, doth reside in a material substance, which may be resembled to Sulphur or Oyle, as some other part may be resembled to Mercury. For all generations are framed of different parts united by this Spirit. Thus much of the different opinions concerning the efficient of all generations, and in particular of minerals. The matter whereof minerals are bred, is attributed chiefly to the Elements, as the general matter of all animate and inanimate bodies: insomuch as both the heavens, and the very souls of men are made to proceed from the Elements.

Concerning the Heavens, it hath been the ancient opinion of the *Platonicks*, *Pythagoreans*, and *Epicureans*, that not only these inferiour bodies, but also the cœlestial, have been framed out of the Elements. *Plato* speaking of the heavens, saith, *Divini decoris ratio postulabat talem fieri mundum, qui & visum pateretur & tactum. Sine igne videri nil potest, sine solido nil tangi: solidum sine terra nihil.* Wherefore holding the heavees to be visible and solid, they must be made of the Elements. The *Pythagoreans*, and the *Brachmanni* of *India* held the same opinion of the Heavens: where *Apollonius Tyanæus* was instructed in all the *Pythagorean* Doctrine, as *Philostratus* reports. The *Epicureans* also were of the same opinion, as appears in *Virgil*, where he brings in *Silenus*, one of the sect, and one of *Bacchus* his crew, singing in this manner,

Trismegistus in Asclepio cap. 1.
Plato. In Timeo in Dialogo de natura.
In vita Apollonii.
Eclog. 6.

Namque canebat, uti magnum per inane coacta
Semina, terrarumque, animæq; marisq; fuissent,
Et liquidi simul ignis: ut his exordia primis
Omnia, & ipse tener mundi concreverit orbis.

Silenus sung, how through the Chaos vast,
The seeds were set of Earth, of Air, of Seas,
Of purest fire: how out of these at last,
All things have sprung, and also out of these
The infant world was moulded.

De sacra Philosoph. cap. 51.

Of this opinion also was *Lucretius*, *Philo Judæus*, *Valesius*, *&c.* although *Valesius* doth make more pure Elements for the Heavens then ours. *Aristotle* forsook his Master *Plato* in this point, and frames the Heavens of a quintessential substance.

But howsoever the Heavens may participate with elementary qualities, and be subject to generation and corruption in their parts; yet methinks they should exempt our souls from this original, and not make them out of the fragments of the Elements.

Scaliger inveys against *Alexander Aphrodisiensis*, for this opinion, and saith that he hath poysoned our Philosophy herein: *Venenavit hanc Philosophiæ partem.* So both he and others derive the sense, motion, understanding, growth, and the natural faculties of our souls, and the peculiar properties of every thing, from this original, *turpissimo errore*, as *Severinus* saith. And *Scaliger* in another place concerning this: *De intellectu & ratione ipsaque anima quæ contami-*

Cap. de mixtione.

nantur

narunt iſtæ nebulæ *Aphrodiſienſes*, & pudet dicere & piget meminiſſe. I am aſhamed to ſpeak, and grieved to think how this *Aphrodiſienſis* hath polluted our reaſon and underſtanding, and our very ſouls with his foggy doctrine, in aſcribing all theſe unto the Elements. By the ſame reaſon they may aſcribe the barking of Doggs, the ſinging of Birds, the laughing and ſpeech of men, to the Elements. Their opinion is more probable, which hold, *animam ex traduce*, and to be communicated as one light to another: as *Timoth. Bright* proves in *Phyſicam Scribonii*, and not to aſcribe it to the Elements, nor to miracles, or new creations. But there is far more reaſon to derive from the Elements, the taſtes, colours, ſmells, figures, numbers, quantities, orders, dimenſions, &c. which appear more in corporal ſubſtances, and yet theſe are not from the Elements. For how can they give theſe affections to other things, when they have them not themſelves? *Si non eſt ab elementis guſtare, quare ſit guſtari?* What taſte have any of theſe Elements? Fire or heat which is the moſt active Element, hath none. And whereas it is thought, that bittterneſs proceeds from heat, we find that many ſharp and tart fruits, being alſo very bitter before they are ripe, (as Olives for example) yet let them hang upon the tree till they be ripe, and they loſe their bitterneſs, and alſo their ſharpneſs, by reaſon of their better concoction by heat. The like difference we find between our *oleum omphacinum*, and theſe oyle. So likewiſe *opium*, which is held to be very cold, yet it is extream bitter, ſo as the cold

parts

parts in it are not able to master the bitterness, but this is still predominant: wherefore heat can be no cause of bitterness, unless it be in excess or defect, as *Scaliger* confesseth. Wormwood is very bitter, being hot and dry in the second or third degree: if heat were the cause of it, then all other simples which are hot and dry in the same degree, should be also bitter. As I have said of tastes, so I may say of all the other affections of natural things, that they proceed not from the Elements, but from the seeds and forms of every thing. So for fat and unctuous substances, as Sulphur, Bitumen, Oyle, Grease, &c. unto what Element shall we ascribe them? Not unto fire, because this is extream hot and dry, that is temperate in heat, and very moist. Moreover, fire would rather consume it, then generate it: and Physitians judge the generation of fat in our bodies to proceed rather from cold, then from heat. Air, if it have any ingenerate quality, as some do make doubt out of *Aristotle* it is cold and moist, as I have shewed before, *cap.* 2. & 5. and therefore as it cannot agree with fire, nor be a fuel to it, so it cannot be any material cause of fat, or oylie substance: being more agreeable to water, from whence it is thought to be made by rarifaction, and into which it is thought to be reduced by condensation. Wherefore being of a watry nature, it cannot agree with oyle or fatness, nor be the matter of it. The like we may judge of water, which doth terminate both water and air, and therefore must be opposite to them both. As for earth, being cold and dry, and solid, it cannot be the matter

1 *Meteorol.* 4. *Item de mundo ubi dicit aerem comparatum esse ad aliam & aliam naturam inducendam.*

matter of this which is temperate, and moist, and liquid; Neither can all the Elements together make this substance, seeing there is no unctuousnes in any of them, and they can give no more then they have. So as I cannot see how this oylie substance, which is very common in all natural things, and wherein the chief faculties of every thing doth reside, as their *humidum radicale*, should be from the Elements.

So likewise for the substance wherewith every thing is nourished and increased, and into which every thing is resolved, it appears not how it should be from the Elements. *Hypocrates*, of whom *Macrobius* saith, *Nec fallere nec falli potuit*, hath two notable axioms for the clearing of this point. The one is *Vnumquodq; in id dissolvitur unde compactum est*. Every thing is dissolved into that whereof it was made. The other, *Iisdem nutrimur ex quibus constamus*, we are nourished by such things as we consist of. *Aristotle* also hath the same. If this axiom be true, as I hold it to be, and I know none that contradict it, then we must consist of such things as we are nourished withall. But we are not nourished by the Elements, and therefore we consist not of them. Fire nourisheth nothing, water nourisheth not, as Physitians confess: Air is too thin a substance, and Earth to thick. And as they do not nourish them when they are single, so being compounded, they can do as little. *Aristotle* saith that some Plants are nourished with water alone, some with earth alone, and some with both together. But if earth and water be mixed for our nourishment, they making but

1 *In som. Scipionis cap. 6.*

De nat. hominis.

2 *De gen. cap. 3. Item lib. de sensu & sensibile.*

3 *De gen. animal. cap. ultimo.*

but mud, would make us have muddy brains. We will grant the Elements to be *matrices rerum naturalium*, the wombs and nurses of natural things, but we will not grant them to be material causes. Neither can we attribute more dignity unto them, then we do to our Mothers, who depart from their substance whereof they consist, as flesh, bones, sinews, veins, arteries, &c. to the nourishment of their Infants, but only prepare blood for them, from the nutriments which they receive. And all the Elements in the world cannot make this blood, neither as the matter nor as the efficient. But as the Mother is furnished with blood to nourish the Infant, and with convenient heat to foster it withall, so are the Elements stored with all manner of matter fit for all generations: so as the seeds or forms of natural things, will never want matter to nourish them, nor will ever want forms. So that it is manifest that if natural bodies be not nourished by the Elements, they are not compounded of them: but being nourished by other substances then the Elements, they must be compounded of the like; *Simile simili nutritur: composita compositis constant & nutriuntur.*

Thus much for the Genesis or generation and nutrition of natural things, that thereby we cannot gather that they are either made or nourished by the Elements. Now let us examine whether by the Analysis or dissolution of them, we may find the four Elements, according to the former axiome, that every thing is dissolved into that whereof it was made, and is made of that whereinto it is dissolved, as *Aristotle, Hypocratis*

crates, and *Galen* do affirm. So that if the Elements enter into the composition of natural things, especially as the principal materials whereof they consist, they must needs appear in the dissolution of them. This dissolution is either natural or artificial. In the natural dissolution of all things, *Hypocrates* observes three distinct substances, *calidum, humidum sive fluidum, & siccum sive solidum*, according to the three Elements or principles whereof they are framed. His instance is principally man, but he affirms it to hold in other animate and inanimate bodies. These Elements he termeth *continentia, contenta & impetum facientia*, as *Galen* expounds it. Those which he calls *continentia*, are bones, nerves, veins, arteries, and from thence, muscles, &c. *Contenta* are *humida*, or *humores*, blood, flegme, choller, melancholy, which after death, are cold, and congeal, being heated as *Galen* saith, from the heart, in living bodies: *Impetum facientia*, are spirits animal, vital and natural.

Isagoge cap. 8. 1 de Elementis cap. 15.

These three Elements, *Galen* acknowledgeth to be the nearest, but the other which are more remote, to be most universal. But *Hypocrates* saith that heat and cold, &c. are very powerless Elements, and that sharp, bitter, sweet, &c. are more powerfull, τῶν μεγάλων δύναμιν ἔχοντα. So that these are the three Elements whereof all things do consist, and into which they are naturally resolved: and these do seem to resemble the four Elements, but are not the same. For heat may resemble fire, although this heat be procured by motion in every thing whilest it liveth,

De veteri medicina.

liveth, and not extrinsecally. Moisture may resemble water and air. Driness may resemble earth; cold appears in them all after the heat or spirit is departed.

In the artificial Analysis of natural bodies, the Alchymists tells us that they find three Elements, and no more, whereof every thing doth consist, and whereinto it is resolved: namely, *Vaporosum, inflammabile, fixum:* which they call Mercury, Sulphur and Salt, and they seem to agree with *Hypocrates.* For their Mercury may well resemble *Hypocrates* his spirits, or *impetum facientia:* Sulphur his humour or *fluidum* or *contenta:* and Salt, his *siccum* or *densum*, or *continentia.* These they say are found in every thing, animal, vegetable, or mineral, and no other. And as for the four common Elements, seeing they are distinct in place and situation, and therefore cannot concurre and meet to the generation of every animal, Plant and Mineral, &c. but by violence, the earth being sometimes carried upwards, and the fire downwards, contrary to their natural motions: and this, not once for all, but daily and hourly: it is not likely that these substances can be bred of the Elements, or be maintained in a perpetual succession by a violent cause. And therefore it is no marvel if these Elements be not found in the dissolution of natural bodies. Thus much in general concerning all generations, that hereby we may the better judge of the particular generations of Minerals, which differ not from the rest, but only in this, that their seeds are not in every individual, as the others are, but are contained in

matricibus

matricibus, in their wombs, and there they are furnished with matter to produce their Species: not out of the Elements, no otherwise than *ex matricibus*, as the child in the mothers womb, but have their matter and nourishment from the seeds of things which are agreeable to their species: which seeds wanting means to produce their own species, do serve others, and yield matter and substance unto them.

Now let us come more particularly to the generation of minerals, wherein we will first examine *Aristotles* opinion, as most generally received, then I will presume to set down mine own.

CHAP. XII.

The generation of Minerals examined, the Authors opinion herein.

A*Ristotle* makes the humidity of water, and the dryness of earth, to be the matter of all minerals: the dryness of earth to participate with fire, and the humidity of water with air, as *Zabarella* interprets it; so that to make a perfect mixt body, the four Elements do concur; and to make the mixture more perfect, these must be resolved into vapour or exhalation by the heat of fire, or influence from the Sun and other Planets, as the efficient cause of their generation: but the cause of their congelation to be cold in such bodies as heat will resolve. This vapour consisting partly of moysture, and partly of dryness,

Erastus, Carerius, Cæsalpinus, Martinus, Morisinus, Foxius, Magyrus, Libavius.

if

if all the moysture be spent, turns to earth or salt, or concrete juyces, which dissolve in moysture: if some moysture remain before congelation, then it turns to stone: if this dry exhalation be unctuous and fat, and combustible, then Bitumen and Sulphur, and Orpiment, are bred of it: if it be dry and incombustible, then concrete juyces, &c. But if moysture do abound in this vapour, then metals are generated which are fusible and malleable. And for the perfecting of these generations, this exhalation is not sufficient, but to give them their due consistence, there must be the help of cold from Rocks in the earth to congeal this exhalation. So that here must be two efficients, heat and cold. And for the better effecting of this, these exhalations do insinuate themselves into stones, in the form of dew or frost, that is, in little grains; but differing from dew and frost in this, that these are generated after that the vapour is converted to water; whereas Minerals are generated before this conversion into water. But there is doubt to be made of frost, because that is bred before the conversion of the exhalation into water, as may appear, *Meteor.* 1. According to this assertion there must be two places for the generation of minerals; the one a *matrix*, where they receive their essence by heat in form of an exhalation, and from thence they are sent to a second place to receive their congelation by the coldness of Rocks: and from this *matrix* come our mineral waters, and not from the place of congelation.

3 *Meteor. c. ult. Cæsalp. l. 3. c. 1.*

Libav. de nat. metall. c. 14. Cæsarius 178. Septal. in Hipp. de aëre, aqua, &c.

This is the generation of minerals, according to *Aristotle*; but it is not so clear, but that

leave

leaves many ſcruples, both concerning the matter, and the efficients. For the matter, it ſeems not probable, that water and earth ſhould make any thing but mud and dirt; for you can expect no more from any thing than is in it, the one is cold and dry, the other cold and moyſt; and therefore as fit to be the matter of any other thing, as of particular minerals. And water, whereof principally metals are made to conſiſt, is very unfit to make a malleable and extenſible ſubſtance, eſpecially being congealed by cold, as we may ſee in ice. But ſome do add a mineral quality to theſe materials, and that ſimple water is not the chief matter of metals, but ſuch as hath imbibed ſome mineral quality, and ſo is altered from the nature of pure water. This aſſertion doth preſuppoſe minerals in the earth before they were bred; otherwiſe what ſhould breed them at the firſt, when there was no mineral quality to be imparted to water? Again, this mineral quality either gives the water or the vapour of it the eſſence of the mineral, and then it is not the effect of water, but of the mineral quality, or the potential faculty to breed it. If the eſſence, then this metallic water, or vapour, muſt have the form of the metal, and ſo be fuſible and malleable. If it have only the power and potential faculty, then the generation is not perfected, but muſt expect further concoction. This concoction is ſaid to be partly by heat, and partly by cold; if by heat, it muſt be in the paſſages of the exhalation as it is carried in the bowels of the earth: for afterwards, when the exhalation is ſetled in the ſtones, the heat is gone.

Now if the concoction be perfected before the exhalation be insinuated into the Stones, as it must be, if it be like dew, then it is perfect metal, and neither is able to penetrate the Stones, nor hath any need of the cold of them to perfect the generation. If by cold, it is strange that cold should be made the principal agent in the generation of metals, which generates nothing; neither can heat be the efficient of these generations. Simple qualities can have but simple effects, as heat can but make hot, cold can but cool, &c. But they say cold doth congeal metals, because heat doth dissolve them; I answer, that the rule is true, if it be rightly applyed: as we see ice which is congealed by cold, is readily dissolved by heat. But the fusion of metals cannot properly be called a dissolution by heat, because it is neither reduced to water or vapour, as it was before the congelation by cold, nor is it permanent in that kind of dissolution, although after fusion it should be kept in a greater heat than the cold could be which congealed it. For the cold in the bowels of the earth cannot be so great, as it is upon the superficies of the earth, seeing it was never observed that [illegible] was any ice bred there. Also this dissolution which is by fusion, tends not to the destruction of the metal (but doth rather make it more perfect) as it should do according to the former rule rightly applyed. And therefore this dissolution by fusion, doth not argue a congelation by cold; which being in the passive elements, doth rather attend the matter than the efficient of generations: for it is apt to dull and hebetate all faculties and motions

Valesius sacra Philosoph. c. 49.

motions in nature, and ſo to hinder generations, rather than to further any. It is heat and moyſture that further generations, as *Ovid* ſaith;

Quippe ubi temperiem ſumpſere humorque calorque, Concipiunt :

When heat with moyſture's temper'd well,
Then 'tis their bellies 'gin to ſwell.

And thus much for *Ariſtotles* generation of minerals, where his vapours or exhalations do rather ſerve for the collection or congregation of matter in the Mines, than for the generation of them; as *Libavius* doth rightly judge. *Agricola* makes the matter of minerals to be *Succus Lapideſcens Metallificus, &c.* and with more reaſon, becauſe they are found liquid in the earth: *Gilgill* would have it Aſhes; *Democritus* Lime: but theſe two being artificial matters, are no where found in the earth. The Alchymiſts make Sulphur and Mercurie the matter of metals: *Libavius*, Sulphur and Vitriol. But I will not ſtand upon diſcourſing of theſe materials, becauſe it makes little to my purpoſe.. It is enough for my purpoſe to ſhew the manner of theſe generations, which I take to be this.

Singularium lib. 1. part. 1.

De nat. metall. cap. 10.

There is a Seminarie Spirit of all minerals in the bowels of the earth, which meeting with convenient matter, and adjuvant cauſes, is not idle, but doth proceed to produce minerals, according to the nature of it, and the matter which it meets withal; which matter it works upon like a ferment, and by his motion procures an actual heat,

The Authors opinion concerning the manner of the Generation of Minerals.

as an instrument to further his work; which actual heat is increased by the fermentation of the matter. The like we see in making of Malt, where the grains of Barley being moistned with water, the generative Spirit in them is dilated, and put in action; and the superfluity of water being removed, which might choak it, and the Barley laid up in heaps; the seeds gather heat, which is increased by the contiguity of many grains lying one upon another. In this work natures intent is to produce more individuals, according to the nature of the Seed, and therefore it shoots forth in spires: but the Artist abuses the intention of Nature, and converts it to his end, that is, to increase the spirits of his Malt. The like we find in mineral substances, where this spirit or ferment is resident, as in Allum and Copperas Mines, which being broken, exposed and moistened, will gather an actual heat, and produce much more of those minerals, then else the mine would yield; as *Agricola* and *Thurneiser* do affirm, and is proved by common experience. The like is generally observed in Mines, as *Agricola*, *Erastus*, *Libavius*, *&c.* do avouch out of the daily experience of mineral men, who affirm, that in many places, they find their Mines so hot, as they can hardly touch them; although it is likely that where they work for perfect Minerals, the heat which was in fermentation, whilst they were yet breeding, is now much abated: the Minerals being now grown to their perfection. And for this heat we need not call for the help of the Sun, which a little cloud will take away from us, much more the body of the earth,

earth, and rocks; nor for ſubterranean fire: this inbred heat is ſufficient, as may appear alſo by the Mines of Tinglaſs, which being digged, and laid in the moiſt air, will become very hot. So Antimony and Sublimat being mixed together, will grow ſo hot as they are not able to be touched: If this be ſo in little quantities, it is likely to be much more in great quantities and huge rocks. Heat of it ſelf differs not in kind, but only in degree, and therefore is inclined no more to one Species, then to another, but as it doth attend and ſerve a more worthy and ſuperiour power, ſuch as this generative ſpirit is. And this ſpirit doth convert any apt matter it meets withall to his own ſpecies by the help of heat; and the earth is full of ſuch matter which attends upon the ſpecies of things: and oftentimes for want of fit opportunity and adiuvant cauſes, lies idle, without producing any ſpecies: but is apt to be tranſmuted by any mechanical and generative ſpirit into them. And this matter is not the Elements themſelves, but ſubterranean ſeeds placed in the Elements, which not being able to live to themſelves, do live to others. *Sic Roma creſcit Albæ ruinis*; the Death of one is the life of another. From this confluence of ſeeds ariſe all the varieties and differences, and alterations which are obſerved in the generation or nutrition of natural things: as in their colours, taſtes, numbers, proportions, diſtempers, &c. Alſo from hence proceed the Tranſplantations which we find in animals, vegetables, and minerals. In animals theſe Tranſplantations are not very

Muffetus in dialogo apologetico.

frequent; yet all our monsters may be referred hereunto, as also the issue which comes from Dogs and Wolves, Horses and Asses, Partriges and Hens, &c. Some do think that the destruction of Sexes is a Transplantation, and that all seeds in themselves are hermophroditical, and neither masculine nor feminine, but as they meet with strong and weak impressions from supervenient causes; From hence come our *Androgyni*, or masculine women, such as *Horace* speaks of,

Carm. lib. 3. od. 6.

Sabellis docta ligonibus versare glebas.

That dig the ground themselves (stout Jades!)
Managing well *Sabean* Spades.

Among those Animals which we call *Insecta*, these Transplantations are more frequent, because their seeds are more equivocal, and easily transmuted from one species to another: as we may see in Worms and Flies, and most evidently in Silk-worms called *Cavallieri*.

In Vegetables these Transplantations are very frequent when one species is grafted upon another, as *Virgil* saith,

Georg. 2.

Et steriles platani malos gessere valentes
Castaneæ fagos: ornusque incanuit albo
Flore pyri, glandemque sues fregere sub ulmis.

The barren Planes did Apples bear;
The Beeches Chesnuts; th' Ash a Pear;
And Hogs did under Elm-trees Acorns tear.

Thus

Thus by commixtion of several species, the first seeds do oftentimes bring forth other fruits then their own.

Miranturque novas frondes & non sua poma.

And stand admiring, double mute,
To see new leaves, and stranger fruit.

But all, as *Hypocrates* saith, by divine necessity, both that which they would, and that which they would not. So likewise Wheat is changed into *Lolium*, Basil into Thyme, Masterwort into Angelica, &c. *De Dieta* 1.

In Minerals we find the like transplantations: as Salt into Nitre, Copperas into Allum, Lead into Tin, Iron into Copper, Copper into Iron, &c. And this is the transplantation whereupon the Alchymists ground their Philosophers stone.

This Seminary Spirit is acknowledged by *Aristotle: Continent (inquit) semen in se cujusq; fœcunditatis suæ causam:* and by most of his Interpreters: and *Morisinus* calls it *Elphesteria*, not knowing how to attribute these generations to the Elements. And this is the cause why some places yield some one vegetable or mineral species above another, *De gen. animal. lib. 2. Foxius, Martinus, Morisinus, Magyrus, Libavius, Velcurio, Valesius, Caverius, Erastus, &c.*

Quippe solo natura subest. Non omnis fert omnia tellus.

It is the nature of the ground.
Not in all Soils are all things found.

This seminary spirit of minerals hath its proper wombs where it resides, and is like a Prince or Emperour, whose prescripts both the Elements and matter must obey; and it is never idle, but alwayes in action, producing and maintaining natural substances, untill they have fulfilled their destiny, *donec fatum expleverint*, as *Hypocrates* saith. So as there is a necessity in this, depending upon the first benediction (*crescite & multiplicamini:*) and this necessity or *fatum* is inherent in the seeds, and not adventitious from the Planets, or any other natural cause. And this is the cause of uniformity in every species, that they have all their proper figures, dimensions, numbers of parts, colours, tastes, &c. most convenient and agreeable to each nature; as *Moses* saith, that God saw that every thing was very good: and *Galen* saith, *Deus in omnibus optimum eligit.* And this I take to be the meaning of his *Lex Adrastia*, which he alledgeth against *Asclepiades*. For if he should mean it as commonly it is understood, of punishment which always follows sin, *nemo crimen in pectore gestat, qui non idem Nemesin in tergo*; No man, though privately, commits a fault, but is degg'd by revenge: in this sense he could not apply it to the confuting of *Asclepiades*. There are also other laws in nature which cannot be altered, both Mathematical, in Arithmetick and Geometry; and Logical, in the consecuting of arguments, &c. But these serve not for *Galens* purpose in this place. He must mean it of a natural necessity or *fatum*, or predestination, that frames every member & part of the body

De Dieta lib. 1.

6 De usu partium c. 12. & 13.

Erasmus in Adagiis.

body to the beſt uſe for the creature. And therefore where *Aſclepiades* propounds an inconvenient frame of parts, he confutes him by this inbred law of nature, which he ſaith, no man can alter or avoid, nor any ſubtility elude, as alſo *Ariſtotle* ſaith. Thus much for the generation of Minerals and other natural ſubſtances. *De mundo. c. ult.*

CHAP. XIII.

Of the cauſes of actual heat, and medicinal virtue in Mineral Waters, divers opinions of others rejected.

NOW I come to ſhew how our mineral waters receive both their actual heat, and their virtues. I joyn them together, becauſe they depend upon one and the ſame cauſe, unleſs they be juices which will readily diſſolve in water, without the help of heat: other minerals will not, or very hardly. Cauſes of heat in mineral waters not.

This actual heat of waters hath troubled all thoſe that have written of them, and many opinions have been held of the cauſes of them.

Some attribute it to wind or air, or exhalations included in the bowels of the earth, which either by their own nature, or by their violent motion, and agitation, and attrition upon rocks and narrow paſſages, do gather heat, and impart it to our waters. Of their own nature theſe exhalations cannot be ſo hot, as to make our water hot, eſpecially ſeeing in their paſſage among cold rocks, it would be much allaied, having no ſup- Wind, Air, Exhalations in the Earth.

ply

ply of heat to maintain it. Moreover, where water hath passage to get forth to the superficies of the earth, there these exhalations and winds will easily pass, and so their heat gone withall, and so our waters left to their natural coldness: whereas we see they do continue in the same degree and tenor, many generations together. If by their agitation and violent motion they get this heat, because no violent thing is perpetual or constant, this cannot be the cause of the perpetual and constant heat of water. Besides, this would rather cause earthquakes and storms, and noyses in the earth, then heat our springs. Moreover, we daily observe, that exhalations and water are never heated by motion, or agitation; as in the Cataracts of the *Rhine* by *Splug*; the agitation and fall of water upon rocks is most violent, and makes a hideous noyse; yet it heats not the water, though it be very deep in the earth. Neither can any attrition heat either air or water, or any soft and liquid thing, but rather make it more cold.

Agitation and violent motion.

Valesius contro. lib. 4. cap. 3. Solinand. l. 1. cap. 4.

Others attribute this actual heat of Bathes unto the Sun, whose beams piercing thorow the pores of the earth, do heat our waters. If this heat which heats our Bathes be caused by the beams of the Sun, then either they bring it intirely from the Sun, as a quality proceeding from thence, or they make it by their own motion. If it come from the nature of the Sun, the Sun must be extream hot that can heat these inferiour parts at such a distance; especially the beams which must carry it, passing thorow the middle region of the air, which is alwayes extream cold,

The Sun.

and

and cannot but cool those beams before they come to us. And if they were able to pass that region without losing their heat, yet they cannot but warm that region, being nearer to their fountain of heat, as well or better then they can warm our waters, in despite of any Antiperistasis. But it is doubtfull whether the Sun be hot of his own nature or no. † The Peripatecks hold it to be hot and dry moderately; yet it must be extream hot, if in this manner it do heat our Bathes. And if the Sun be capable of heat, they must also make it capable of cold (elementary qualities) and then they make celestial bodies obnoxious to generation and corruption; which they are not willing to grant. Although in this respect they need not fear the decay of the Sun, no more then of the globe of the earth: which though it suffer in his parts many alterations, yet the whole remains firm and perpetual, as Mr. Doctor *Hakwell* proves in his learned work upon that argument; and will so do untill it be dissolved by that omnipotent power which framed it. If they make this heat to come from the motion of the Sun, we must consider how the Sun by motion may get such a heat. The Sun is either moved by his own motion, or as he is carried in his Sphear wherein he is fixed. If by his own motion, it must be either by volutation upon his *axis*, which is called κύλισις, or by circumgyration, which is called νόησις, round about the globe of the earth: and this is the common opinion; which if it be so, he must be carried more swiftly then a bullet out of a peece of Ordnance. I read in the Turkish History

† It may be so in former times, but few, I think, do doubt it now; I am sure not those who hold the Sun to be a Flame.

His Apology.

ſtory at the ſiege of *Scodra*, of a bullet of twelve hundred weight called the Prince, and it ſeems a great matter. But to have ſuch a bullet as the globe of the Sun, which is held to be 166 times bigger then the globe of the earth, to be carried in a ſwifter courſe, and that perpetually, is a monſtrous, furious, and mad agitation, *inſana motus*, as one termeth it. The like may be ſaid of the motion of the Sphears: but I will leave the confutation of this to others. But admit it to be ſo; and that this violent agitation is not repugnant to the perpetuity of the Heavens, and that it is able to breed an extream heat in the Sun and celeſtial Spheres, notwithſtanding their tenuity, &c. which is unapt to breed heat by motion or colliſion, for that is proper to ſolid ſubſtances: yet this heat muſt be conveyed to us by the ſame beams of the Sun, and muſt be ſubject to the former impediments.

Gilbertus de magnete lib. 6. Taurellus de primis rerum principiis. Conrad. Aſtacus de triplici cælo.

Wherefore the beams of the Sun by their motion muſt make this heat, by the collection of many beams together. For if they be diſperſed, no fire will be kindled, but only ſome moderate heat: as we ſee in a burning-glaſs, which will heat a white paper or cloth, but not burn it. Other things it will burn, which are apt fewels; but the whiteneſs of the paper or cloth it ſeems diſperſeth the beams. But no doubt the Sun by his light and beams do warm theſe inferiour parts, eſpecially where they have free paſſage, and reflection withall, and it is to be judged, that the heat not being eſſentially in the Sun, is an effect of the light by whoſe beams it is imparted to us: So that where light is excluded,

heat

eat is also excluded. And if we can exclude he heat of the beams of the Sun by the inposition of a mud wall, or by making a Cel- fix foot under the ground; how is it likely at these beams can pierce so deep into the arth, as to heat the water there, as *Lucretius* ith,

Qui queat hic subter tam crass, corpore terram Lib. 6.
Percoquere humorem, & calido sociare vapori?
Praesertim cum vix possit per septa domorum
Insinuare suum radiis ardentibus aestum.

Under this massie bulk of earth how shall
The Sun boil water, and there raise a steam
Whereas we see it scarce can pierce a wall,
And through't into a Chamber dart a beam.

And if the beams of the Sun be not able to heat a standing Pool in the midst of Summer, how should they heat a subterranean water, which is always in motion, especially in the winter time? Again, if this heat come from the Sun, then in the Summer, when the Sun is hotteſt, the waters should be so also, and in winter cold, because of the absence of the Sun; but we find them always like. Also, why should the Sun heat some few Fountains and pass over an infinite number of others, which are left cold? And why should there be hot Fountains in cold Climates, where the Sun hath little power to heat, either by reason of his oblique beams, or by reason of his long absence; and yet in hot Climats they should be so ne? wherefore it is very improbable that our prings are heated by the Sun.

Others

Antiperistasis. Others have devised another cause of this actual heat of Bathes, more vain then the former, which they call *Antiperistasis*: where by reciprocation or compression, any quality is intended and exalted to a higher degree. As where heat or cold are compassed by their contrary quality, so as the vapours or *effluvium* of it is reflected back again, the quality thereof is increased. *Hypocrates* gives us an example of it in our own bodies, where he saith, *ventres hiemi calidiores*, our stomachs are hotter in Winter then in Summer, by reason the ambient air being then cold, doth stop the pores of the skin, and repell those fuliginous vapours which nature would breathe forth, and so our inward heat is increased: whereas in the Summer, by reason of too much eventilation, our natural heat is diminished; and therefore we concoct better in Winter then in Summer. And although it be not simple heat which concocts, and makes *chylus* in the Stomach, Blood in the Liver, Seed in the Spermatick Vessels, or Milk in the Breast, *In Paradoxis.* &c. as *Joubertus* saith: yet heat attending upon the faculties of those parts, doth quicken them, as cold doth benumb them. But if we examine this example aright, we shall find a great difference between this and our hot Bathes. For the heat in our bodies is continually fed and maintained from the Heart by his motion: that of Bathes hath no such supply according to their doctrine, from any cause to make or continue this heat. And therefore the repelling of vapours cannot make water hotter then it is: and being naturally cold, and without any heat

where heat is not, how can it be pend in or repelled? Again, in *Hypocrates* his example there is an *interstitium* (our skin) between the fuliginous vapours and the external air, which keep them from uniting: but in our Bathes there is nothing to hinder the meeting and conjunction of these qualities, and then the one must dull the other. Moreover, we see that any thing that is naturally cold, as Iron or a Stone, if it be made hot accidentally by fire or otherwise, it is sooner cold in cold air, then in a warm place. So that the *Antiperistasis* doth rather diminish then increase the heat of it. Wherefore unless water were naturally hot, or the heat maintained by some continual cause, this *Antiperistasis* can do no good, but by his opposite quality would rather cool it. Nay heat it self cannot make any thing more hot, unless it be greater then the heat of the thing it self. But to ascribe the generation of heat to cold, and so to make it the cause of his contrary, is against the law of Nature. No quality of it self is increased by his contrary. It is true, that a pot of water set over the fire, will be sooner hot, being covered, or otherwise the vapours kept in, then being open: but there must be fire then to heat it, and to continue the heat: otherwise the *Antiperistasis* will do nothing, unless it make it more cold, and congeal it into Ice, if the air ambient be more cold then the water. Some may object, that they find some Fountains warmer in Winter then in Summer, and to reak when they break forth into the air; as I have seen at *Wercksworth* and *Bakewell* in *Darbyshire*: and therefore this doth argue an *Antiperistasis.*

3 Simpl. medic. facult. cap. 7.

periſtaſis. *Galen* thinks that theſe waters do but ſeem ſo to our ſenſe: our hands being hot in Summer, and cold in Winter, as our Urins ſeem cold in a hot Bath. But I will grant with *Valeſius* that many deep Fountains may be ſo indeed, and not in appearance only, as partaking with ſome warm exhalations, eſpecially in Mineral Countreys, as *Darbyſhire* is.

Moreover, if our Bathes were heated by an *Antiperiſtaſis*, then they ſhould be hotter in Winter then in Summer; but we find them alwayes alike. Alſo if a cold ambient be able to make cold water hot, why ſhould not a hot ambient make it more cold? eſpecially ſeeing the vapours are cold, which being repelled by heat, which doth terminate cold, ſhould increaſe the coldneſs of the water. Alſo if we ſhould grant this *Antiperiſtaſis*, we muſt deny the reaction and reſiſtance between the qualities of the Elements: and ſo overthrow all temperaments which ariſe from thence: and alſo our compoſition of medicines were in vain. Wherefore this *Antiperiſtaſis* is an idle invention to maintain this purpoſe.

Valeſius contro. lib. 1. cap. 5. Magyrus lib. 3. cap. 3.

Quick Lyme.

Others attribute this actual heat to quick Lyme, which doth readily heat any water cast upon it, and alſo kindle any combuſtible ſubſtance put into it; this is *Democritus* his opinion. To this I anſwer, that Lyme is an artificial thing, not natural, and is never found in the bowels of the earth. Beſides, if it were found, one fuſion of water extinguiſheth the heat of it, and then it lyeth like a dead earth, and will yield nor more heat. So as this cannot procure a perpetual

tual heat to Bathes: neither can the Lymestones without calcination, yield any heat to water, nor will break and crackle upon the affusion of water, as Lyme doth. Wherefore this opinion is altogether improbable.

Others attribute this actual heat to a subterranean fire kindled in the bowels of the earth. Let us consider how this may be. Fire is a quality and the highest degree of heat, which cannot subsist without a subject; for I define it to be *intensissimus calor in corpore cremabili:* The highest degree of heat in a combustible body: And it is received into his subject either by propagation or coition, as when one candle lights another, or by motion, as collision, concussion, dilatation, compression, putrefaction, fermentation, reflection, &c. yet all motion doth not kindle fire although it heat; neither are all substances apt to be heated by motion. Air and water are rather colder by motion: but this rule holds in such things as are apt to receive heat by motion, as solid substances, combustible substances, &c. And the heat of animals, vegetables, and minerals, which they have for their generation and nutrition, is from motion: although this heat is not in so high a degree as fire is, for then it would consume them; but as the motion is moderate, and agreeable to each nature, so is the heat. This motion in natural things proceeds from their seeds or forms, and may be called internal or natural. External motions are violent agitations, concussions, &c. which commonly kindle fire in apt matter. As for the element of fire, which should be pure, not shining, Subterranean Fire.

and therefore inviſible, and ſubſiſting without a ſubject or fewel: let them find it who know where to ſeek for it. For my part I know no element of fire, unleſs we ſhould make it to be that which is natural to all creatures and their ſeeds, cauſing their fermenting heat, whereof I ſhall ſpeak anon. And this interpretation we may well make of *Hypocrates*, where he ſaith, that all things are made of fire and water; and that theſe two are ſufficient for all generations; fire giving motion, and water nutrition. And it is not likely that this fire ſhould be fetched from a remote place, and downwards, againſt the nature of fire, for every generation: but that it be near hand, and inbred in the ſeeds themſelves, as the principal ingredient into every natural thing; whereas if it were remote, what ſhould bring it continually, and unite it with the other elements in theſe generations? Wherefore this is moſt likely to be the element of fire. Our burning fire is all of one nature, not differing in kind, but only in degree according to the quality of the fewel. Some fewels will make a manifeſt flame, as all thin and light ſubſtances, Sulphur, liquid Bitumen, Oyle, Fat, &c. Some only a glowing coal, with little or no flame, as ſome ſorts of Stone-coal. Yet all fire doth ſend forth fuliginous vapours, which would choak it if there were not vent for them into the air: as we ſee in the making of Char-coal, although they cover their fire with lome, yet they muſt leave ſome vent for the ſmoke; though not ſo much as may make it to flame, yet enough to maintain the fire. Of the firſt flaming ſort there

p: ditta lib. 1.

are

are divers degrees, as that of Straw, Brimstone, Spirit of Wine, Naphtha, Petroleum, &c. Some of which will scarcely take hold upon other fewel: as one may wet a linnen cloath in Spirit of Wine, and being kindled, he shall hardly find the cloath scorched. The like hath been observed in that exhalation which is called *ignis fatuus*, being of a very thin substance, from Bitumen or Naphtha. Some reckon Comets among these fiery exhalations: but I can hardly believe that they are any kindled substances. First, because their flame is not pyramidal, as it is in all kindled substances. Secondly, because if they be of a thin substance from Sulphur and Bitumen, the flame would be greater, seeing it must be plentiful, if it continue so long in burning, as we find them to do. Or admit that this matter be kindled by succession, yet it is incredible that it should continue burning above a year together; as that Comet *Xiphian*, which lasted a whole year: Another, *Anno* 1572. under the constellation of *Cassiopea*, lasted a year and a half, others six months, others three, &c. If the Sulphurous or Bituminous matter be thick, it will melt in burning, and rain down Brimstone and Bitumen upon us. Thirdly, if Comets were kindled substances, what entertainment could they find above the Moon, and among the spheres, where they say no corruptible or elementary substance can be indured. But many of our Comets have been observed to have been above the Moon, and some among the fixed Starrs, as hath been observed by *Tycho Brahe*, and *Clavius*: and upon due observation

Comets, probably not kindled substances.

they could find some of them to admit no Paralaxis, or diversity of aspect to any star in different Climats.

This argumnnt may be good against a Peripatetick; but a Platonist, or a Pythagorean, who hold the Heavens to be made of elementary matter, and subject to generation and corruption, will not allow it, no more will many of our Divines.

For glowing fires, we have none but they must be kindled, and then they must have vent for their fuliginous vapours, and they must be kindled either by propagation or coition from some other fire, or by violent motion able to kindle them, which we shall hardly find in the bowels of the earth, where all is quiet, and no space for any such perturbation.

But they say there is an *ignis subterraneus*, which being kindled upon Sulphur and Bitumen, dispersеth it self among other Mines of the like nature, and sets them on fire. Now we are come from Heaven to Hell, or to Purgatory at the least, which *Pythagoras* calls *materiam vatum falsique pericula mundi*; The dream of Poets, and a forged fear. The largest description of it is in *Virgil*: from whence both Divines and Philosophers derive much matter: and *Baccius* doth believe that there is such a thing in the Center of the Earth. But if we observe *Virgil* well, we shall find that he propounds it but as a dream: for in the end of that Book he saith,

Metamorph. 15.

Sunt

Sunt geminæ ſomni portæ; quarum altera fertur Æneid. 6.
Cornea, qua veris facilis datur exitus umbris:
Altera candenti perfecta nitens Elephanto,
Sed falſa ad Cœlum mittunt inſomnia manes.

Dreams have two gates, the one is ſaid to be
Of Horn, through which all true conceits do flee;
The other framed all of Ivory rare,
But lets out none but ſuch as forged are.

Now ſaith he, when *Anchyſes* had led *Æneas* and *Sibilla* through Hell, he lets them forth at the Ivory gate (*Portaque emittit Eburna:*) As if he ſhould ſay; all that I have related of Hell, is but a fiction; and thus *Ludovicus Vives* interprets it in his Comment upon this place.

I hope none will think that I deny a Hell, but I approve not of the aſſignment of it to the center of the earth, or that that fire ſhould ſerve as *Baccius* would have it, to further all generations in the earth: and as others, to be the cauſe of Fountains, Winds, Earth-quakes, Vulcanoes, Storms, Saltneſs of the Sea, &c. nor of the actual heat of our Bathes, although it be the moſt common received opinion.

Firſt for the place, it is not likely that the center of the earth, whither all heavy things do tend, ſhould be hollow, but rather more compact then any other part of the earth, as likewiſe *Valeſius* thinks; but if there be any concavities, they are between the Center and the Superficies; and theſe concavities being receptacles of water from the Sea, cannot alſo receive fire.

Agricola. Baccius l. 1. cap. 19.

These two will not agree together in one place, but the one will expel the other: for whereas some hold that Bitumen will burn in water, and is nourished by it, it is absolutely false, as experience shews; and I have touched it among the *Bitumina*.

Moreover, if the heat which warms our Bathes did proceed from hence, there must be huge vessels above the fire to contain water, whereby the fire might heat it, and not be quenched by it. Also the vapours arising from hence, must be hotter then water can endure, or be capable of; for as they ascend towards the superficies of the earth, they must needs be cooled as they pass by Rocks, or else they could not be congealed into water again: and after this congelation, the water hath lost most of his heat, as we find in our ordinary distillations of Rose-water, &c. where we see our water to descend into the receiver, almost cold; so that they cannot derive our hot Bathes from hence.

Secondly, for the fire it self, although water and air may be received into the bowels of the earth, yet there is great difficulty for fire. For the other two need no nourishment to support them, as fire doth. If there be not competency of air to nourish the fire by venting his fuliginous vapours, howsoever there be fewel enough, it is suddenly quenched, and such huge and flaming fire as this must be, will require more air then can there be yielded: a great part thereof passing away through the secret creeks of Rocks, and little or none entring through the Sea. And therefore daily experience shews, that our mi-

neral

neral men are fain to ſink new Shafts (as they call them) to admit air to their works, otherwiſe their lights would go out. Although one would think, that where many men may have room enough to work, there would be ſpace enough for air to maintain a few lights. The like we ſee in Cupping-glaſſes, where the light goes out as ſoon as they are applied. Alſo there are no fires perpetual, as hot Bathes are, but are either extinct, or keep not the ſame tenor. Wherefore fire cannot be the cauſe of this conſtant heat of Bathes. It muſt be a continual cauſe that can make a continual heat. Alſo where fire is, there will be ſmoak, for as it breeds exhalations, ſo it ſends them forth. But in moſt of our hot Bathes we find none of theſe dry exhalations. Moreover, fire is more hardly pend in then air; yet we ſee that air doth break forth: wherefore fire ſhould alſo make his way, having fuel enough to maintain it. So they ſay it doth in our Vulcanoes at *Hecla* in *Iſeland*, *Ætna* in *Sicicy*, *Veſuvio* in *Campania*, in *Enaria*, *Æolia*, *Lipara*, &c. But it is yet unproved that theſe eruptions of fire do proceed from any deep cauſe, but only are kindled upon or neer the ſuperficies of the earth, where there is air enough to feed it, and means enough to kindle it by lightnings, or other caſual means. Whereas in the bowels of the earth, there is neither air to nouriſh it, nor any means to kindle it; ſeeing neither the beams of the Sun, nor Wind, or other Exhalations, nor any Antiperiſtaſis, nor Lyme, nor Lightnings can do it. For the ſame reaſons that exclude the Beams of the Sun and exhalations

exhalations, will likewise exclude lightnings.

Thirdly, for the fuel, there are only two substances in the bowels of the earth, which are apt fuels for fire, Bitumen and Sulphur.

Donatus de aquis Lucensibus lib. 1. cap. 18.

Sulphur is in such request with all men, as they think there can be no hot Bath without it: nay many hold, that if water do but pass thorow a Mine of Brimstone, although it be not kindled, but actually cold, yet it will contract from thence, not only a potential, but an actual heat. But we do manifestly find, that neither all hot waters are sulphurous, nor all sulphurous waters hot (as is said before in Sulphur.)

Gesner. Epist. lib. 3. pag. 90.

The Bathes of *Caldanella* and *Avinian in agro Senensi*, *de Grotta in Viterbio*, *de aquis in Pisano*, *Divi Johannis in agro Lucensi*, *Balneum Gebersuilleri in Halsatia*, *&c.* are all hot, and yet give no signe of Sulphur, either by smell, or taste, or quality, or effect. Contrariwise that all sulphurous waters are not hot, may appear by the Bathes in *Zurich* in *Helvetia*, of *Buda* in *Pannonia*, at *Cure* in *Rhetia*, *Celenses* in *Germany*. In *Campania* between *Naples* and *Puteolum*, are many cold sulphurous Springs. At *Braudula in agro Carpensi*, *&c.* All which Bathes shew much Sulphur to be in them, and yet are cold. And no marvel, for if we infuse any simple, be it never so hot potentially, yet it will not make the liquor actually hot. Wherefore this Sulphur must burn before it can give any actual heat to our Bathes; and then it must needs be subject to the former difficulties, and also must be continually repaired by new generations of matter, which actual fire cannot further, but rather hinder.

der. The fire generates nothing, but consumes all things. *Lib. 1. cap. ult.*

The like we may judge of Bitumen, that unless it be kindled, it can yield no heat to our Bathes; as *Solinander* reports of a Bituminous Mine in *Westfalia, in agro Tremonensi*, where going down into the Grove, he found much water, having the smell, taste, and colour of Bitumen, and yet cold. *Agricola* imputes the chief cause of the heating of Bathes, unto the fuel of Bitumen; *Baccius* on the other side to Sulphur. But in my opinion, they need not contend about it. For, as I have shewed before in the examples of mineral waters, there are many hot Springs from other minerals, where neither Sulphur nor Bitumen have been observed to be. *John de Dondis*, and *Julius Alexandrinus* were much unsatisfied in these opinions, and did rather acknowledge their ignorance, then that they would subscribe unto them. I need not dispute whether this fire be *in Alveis*, or *in Canalibus*, or *in vicinis partibus, &c.* because I think it is in neither of them.

CHAP.

CHAP. XIV.

The Authors opinion concerning the cauſe of actual heat, and medicinal virtue in Mineral Waters.

WHerefore finding all the former opinions to be doubtfull and weakly grounded concerning the cauſes of the actual heat of Bathes; let me preſume to propound another, which I perſwade my ſelf to be more true and certain. But becauſe it hath not been mentioned by any Author that I know, I have no mans ſteps to follow in it.

Avia Doctorum peragro loca, nullius ante
Trita ſolo.

I travel where no path is to be ſeen
Of any learned foot that here hath been.

Which makes me fearfull in the delivery of it. But if I do err in it, I hope I ſhall not be blamed; ſeeing I do it in diſquiſition of the truth.

I have in the former Chapters ſet down mine opinion concerning the generation of minerals, that they have their ſeminaries in the earth repleniſhed with ſpirits, and faculties attending them; which meeting with convenient matter and adiuvant cauſes, do proceed to the generation of ſeveral ſpecies, according to the nature of the efficient, and aptnes of the matter. In this

this work of generation, as there is *generatio unius*, ſo there muſt be *corruptio alterius*. And this cannot be done without a ſuperiour power, which by moiſture, dilating it ſelf, worketh upon the matter, like a ferment to bring it to his own purpoſe. This motion between the agent ſpirit, and the patient matter, proceedeth from an actual heat (*ex motu fit calor*) which ſerves as an inſtrument to further this work. * And this motion being natural and not violent produceth a natural heat which furthers generations, not a deſtructive heat. For as cold dulls and benumbs all faculties, ſo heat doth quicken them, This I ſhewed in the example of Malt. It is likewiſe true in every particular grain of Corn ſown in the ground, although by reaſon they lie ſingle, their actual heat is not diſcernable by touch, yet we find that external heat and moiſture do further their ſpiring, as adiuvant cauſes; where the chief agent is the generative ſpirit in the ſeed. So I take it to be in minerals, with thoſe diſtinctions before mentioned. And in this all generations agree, that an actual heat, together with moiſture, is requiſite: otherwiſe there can neither be the corruption of the one, nor the generation of the other. This actual heat is leſs ſenſible in ſmall ſeeds and tender bodies, then it is in the great and plentifull generations, and in hard and compact matter: for hard bodies are not ſo eaſily reduced to a new form, as tender bodies are; but require both more ſpirit and longer time to be wrought upon. And therefore whereas vegetable generations are brought to perfection in a few months, theſe mineral

* What Dr. *French* hath ſaid againſt this opinion, may be ſeen in the 19, 20, & 21. pages of his *Yorkſhire* Spaw.

mineral generations do require many years, as hath been obſerved by Mineral men. Moreover, theſe generations are not terminated with one production, but as the ſeed gathereth ſtrength by enlarging it ſelf, ſo it continually proceeds to ſubdue more matter under his government: ſo as, where once any generation is begun, it continues many ages, and ſeldome gives over. As we ſee in the Iron Mines of *Illua*, the Tin Mines in *Cornwall*, the Lead Mines at *Mendip*, and the *Peak*, &c. which do not only ſtretch further in extent of ground, than hath been obſerved heretofore; but alſo are renewed in the ſame groves which have been formerly wrought, as our Tinners in *Cornwall* do acknowledge; and the examples of *Illua* and *Saga* before mentioned, do confirm. This is a ſufficient means for the perpetuity of our hot Springs; that if the actual heat proceed from hence, there need be no doubt of the continuance of them, nor of their equal tenor or degree of heat.

Now for the nature of this heat, it is not a deſtructive heat, as that of fire is, but a generative heat joyned with moyſture. It needs no air for eventilation, as the other doth. It is in degree hot enough for the hotteſt Baths that are, if it be not too remote from the place where the water iſſueth forth. It is a means to impart the qualities of minerals to our waters, as well as heat, by reaſon the minerals are then *in ſolutis principiis*, in their liquid forms, and not conſolidated into hard bodies. For when they are conſolidated, there are few of them that will yield any quality to water, unleſs they be the concrete

juyces,

juyces, or any actual heat, because that is procured by the contiguity of bodies, when one part lyeth upon another, and not when they are grown *in corpus continuum*; as we see in Malt, where by turning and changing the contiguity, the heat is increased, but by suffering it to unite, is quenched: But before consolidation, any of them may yield either spirit or juyce, or tincture to the waters, which by reason of their tenuity (as is said before) are apt to imbibe them. Now if actual fire kindled in the earth, should meet with these minerals whilst they are in generation, it would dissipate the spirits, and destroy the minerals. If it meet with them after consolidation, it will never be able to attenuate them so, as to make them yield their qualities to water. For we never find any metals or minerals melted in the earth, which must be, if the heat of actual fire were such as is imagined: neither do we ever find any flores of metal sublimed in the earth. This natural heat is daily found by our Mineral men in the Mines, so as oftentimes they are not able to touch them, as *Agricola* testifieth; although by opening their groves and admission of air, it should be well qualified. Whereas on the other side, it was never observed, that any actual kindled fire was ever seen by workmen in the earth, which were likely to be, if these fires were so frequent.

Thurneiser Alchimia magna lib. 4, c. 8.

Wherefore seeing we see that Mineral waters do participate with all sorts of Minerals, as well metals as other, as hath been shewed in the particular examples of all of them: seeing also that few of them, unless Mineral juyces, are able to impart their quality to water, as they are consolidated

solidated, but only as they are *in solutis principiis*, and whilst they are in generation, as is agreed upon by all Authors: seeing also this natural heat of fermentation must necessarily be present for the perfecting of their generation, and is sufficient, in regard of the degree of heat to make our Baths as hot as they are: seeing also that the other adventitious fire would rather destroy these Minerals, than further them: seeing also we cannot imagine it either likely, or possible, without manifold difficulties and absurdities: I do conclude that both the actual heat of Baths, and the Mineral qualities which they have, are derived unto them by means of this fermenting heat: * Which is still *in fieri*, not *in facto esse*, as the Schoolmen term it: and therefore makes the heat continual.

The cause of the heat in Bath, assigned by Dr. *Rouzee*, is their motion and agitation in the bowels of the Earth, falling from Cataracts and broken Concavities in the same. But afterwards, lighting on this opinion of Dr. *Jordens*, he is so far from disliking, that he applauds it, and deservedly calls this work learned and elaborate. *Vid. Lud. Rouz. Tr.* of *Tunbr.* water, p. 20, 21. & 22. in margine.

Examples might be brought from all kind of generations, and from some artificial works, of this fermenting heat proceeding from the seeds of natural things. These seeds containing the species and kinds of natural bodies, are not from the Elements, but are placed in the Elements, where they propagate their species and individuals, according to their nature, and have their due times and seasons of appearing upon the Srage of the World. Animals have their set times when their spermatick spirits are in turgescence, some

Martin. de prima generatione.

some once, some twice a year, and some oftner: especially in the Spring; *Vere magis, quia Vere calor redit ossibus*; as *Virgil* speaks of Mares: only man in regard of his excellency above other creatures, is not so confinde.

Vegetables have likewise their seasons of setting and planting, as they may have the earth and the season most convenient: yet at any time, if their seeds get moysture and heat to dilate them, they will ferment and attempt the production of more individuals: but oftentimes the Artist doth abuse this intention of nature, and converts it to his ends: and oftentimes nature being set in action to proceed *a potentia in actum*, doth want convenient means to maintain her work: as when we see a Rick of Hay or Corn which hath received moysture, burnt to ashes. So in the making of Malt, or Woad, or Bread, or Beer, or Wine, &c. we make use of this generative spirit for our ends: that we may stir up, and quicken it. Otherwise our Bread would not be so savoury, our Beer would be but Wort, our Wine would be but Must or Plum-pottage, and want those spirits which we desire; and which lie dead and benummed in the seeds, untill they come to fermentation. And in all these there is an actual heat, although it appear not in liquid things, so well as in dry: because it is there quenched by the abundance of moysture; yet we may observe active spirits in it, by the bubling and hissing, and working of it. This is evident in artificial Wines, which may be made of Figs, Dates, dryed Rayins, Currants, Slows, Strawberries, Brambleberries, and such like, when they are infused in

Water.

water. They will ferment of their own accord, by virtue of the seeds which are in them, and make as good and as natural Wine as the juice of the green fruit, as I have often proved. The Turks have a drink which they call Couset or Posset, which is made of Barly after such a manner, as *Bellonius* reports in his observations. It seems also that the Scythians drink was made in this manner, which *Virgil* speaks of.

Lib. 2: cap. 98.

Hic noctem ludo ducunt, & pocula læti
Fermento atque acidis imitantur vitea sorbis.

Georg. 3.

They dance and quaff, by the Moon-shine,
Fermented juice of Slows, like Wine.

And I perswade my self that we have not yet attained to a perfect artifice of our Beer and Ale, which stands upon the same grounds, and may be wrought in such a manner, if they would take the pains to try some conclusions upon it. It might save much fuel, and vessel, and labour, and perhaps with advantage in the product. For I see but two points to be observed in the working of it: the one is to extract the substance of the Malt into water: the other to give it his due fermentation. And both of these may be done without boyling. But the artifice will differ somewhat from Wine, and will require many conclusions to be tryed upon it, before it be brought to perfection. I do mention these artifices only to shew the power of this seminary and fermenting spirit, and how it may be drawn to other uses for our benefit. As this is found in vegetables,

vegetables, so likewise in Minerals; which as they have this generative spirit for the propagation of their species, as hath been shewed before, so they have this means of fermentation, to bring them from a potential quality, to an actual existence. And as their matter is more plentifull, and in consistence more hard and compact; so these spirits must be more vigorous and powerfull to subdue it: and consequently the heat of their fermentation must be in a higher degree, then it is in other generations.

A brief collection of the the Authors arguments against the opinions of others touching the actual heat of Bathes.

Now having shewed the erroneous opinions of others concerning this actual heat of Bathes, and explain'd our own conceit of the true cause of it; let us collect our arguments together, the principal whereof are here and there dispersed in this Treatise,

Quem nos strawineum pro tempore fecimus,

Which for the present I have made of Straw.

Hoping that hereafter some worthy pen may handle this argument more accurately, and give it a better flourish,

Et dare perpetuo cœlestia fila metallo.

And on firm metal lasting threads bestow.

We must not imagine that the government and ordering of the world and nature in a constant course, is performed by miracle, but that natural effects have natural causes, and must

be both under the same *genus*. Wherefore following the ordinary distribution, seeing it comprehends all, and not questioning the celestial bodies, whether they be elementary or no, that is, subject to alterations, as intention and remission, generation and corruption, &c. We say that this heat must proceed either from the superiour and celestial bodies, as the Spheres and Starrs, or from the inferiour or sublunary.

From the superiour Spheres or Globes it cannot proceed, seeing (as is shewed before) they are neither indowed with such a degree of native heat, nor can acquire it accidentally by their motion, being thin and liquid bodies; neither, if they had it, can they convey it unto the earth, but by their beams, which are not able to retain it as they pass thorow the cold region of the air, nor able to warm that, although it be nearer to their fountain of heat. Wherefore if these beams can any way do it, it must be by their motion and reflection upon the earth: and this is no constant heat, but varieth according as the beams are perpendicular or oblique, and according as the air is cleer or cloudy, &c.. And as they are not able to give this constant heat, so the earth in her bowels is not capable to receive it, being hindered by the density of the earth and rocks, and the heat of reflection taken away before it can come three foot deep.

From the inferiour parts of the world if it proceed, it must be either from the Elements, or from mixt bodies. From the Elements it cannot come, but from fire; for all the other Elements are cold, as I have shewed, especially the earth

earth where this heat is ingendred.

And as for the Element of Fire, seeing we know not where to find it, neither, if it be any where, doth it perform the office of an Element in production and nutrition of creatures; as *Aristotle* saith, *Ignis nil generat*, and therefore *nil nutrit*; *nam nutritio fit ex iisdem ex quibus constat*: therefore as it begets nothing, so it nourisheth nothing; and so cannot be an Element, nor as an Element maintain this heat of Bathes. But contrariwise if it have no power of begetting or nourishing any thing, it must have a power of destroying or hindering nature in her proceedings; for nature will admit of no *vacuum* or idle thing. Also seeing Nature useth no violent means to maintain her self, this elementary fire cannot be pen'd in the center of the earth, being of a thin subtil nature, and naturally aspiring upwards: and if it have any place assigned unto it, it must be above the other Elements, and then it cannot be drawn downwards against his nature, and that continually, without breach of the order and course of nature. And whereas they place the Element of Fire under the concave of the Moon, being in it self lucid and resplendent, it is strange that it is not seen by us, neither makes our nights light. For although by reason of his transparency it doth not terminate our sight, yet it should remove the obscurity of our nights much better then the *Via lactea*. Moreover, if it were there, we must see the Starrs through a double *Diaphanum*, one of air, and another of fire, and so would make a double refraction: which is elegantly confuted by *John Pena* and *Conradus Asclacus*.

3. *De gen. animal.*
2. *De gen. animal. cap.* 3.

In præfat. in Opticum Euclidis. De triplici cœlo lib. 1. *c.* 4.

But there is another thing ſubſtituted in the place of this element of fire, and maintained by air, and by mineral ſubſtances in the earth; which is neither an Element, nor a mixt body, nor any ſubſtance at all, but a meer quality: and this is preferred by moſt to be the cauſe of the heat of our Bathes. And this is our common kitchin-fire, which is kindled by violent motion, maintained by fewel, without which it cannot ſubſiſt, and extinguiſhed by his contrary. And although it may be derived by communication or coition, as one candle lights another, yet originally it is kindled by violent motion, and what violent motion can there be in the bowels of the earth to ſtrike fire, or who ſhall be the fueller? Exhalations and lightnings cannot do it, being aereal meteors, and no more penetrable then the beams of the Sun. And therefore although they may kindle a Vulcano upon the ſurface of the earth, yet they cannot pierce deep, and their very reflection upon the ſuperficies of the earth takes away their ſtrength: ſo as they can neither kindle new fire, nor communicate that which is kindled to any other fuel. For if it be by communication or coition, that muſt be by touch, *per contactum*, and then in the earth it can make but one fire, and not many, being not diſtinct in place, and muſt increaſe in heat: and then it will not keep a conſtant tenor, as our Bathes do.

Secondly for the nouriſhment of it, being a quality, it muſt have a ſubject, that is fuel, and it muſt have means to vent the fuliginous vapours which it breeds in the diſſolution of the fuel, leſt they

they recoyle and quench the fire; as alſo there muſt be conveyance for the aſhes which will fall down continually upon the fire, and quench it. Moreover, by conſuming ſuch great quantities of Sulphur and Bitumen, and by mollifying and breaking of Rocks, it would cauſe a great ſinking of the earth in thoſe places; as we ſee in our Vulcanoes, where whole mountains have been conſumed and brought to even ground.

Thirdly, this fire being a quality, is ſubject to intention and remiſſion, and to utter extinguiſhment, not only by want of fuel, which cannot be regenerated where this actual fire is, nor for want of vent, or choaking of aſhes, &c. but alſo by reaſon of the abundance of water which the earth receiveth for the generations of Minerals, which being oppoſite to fire, would quench it. Wherefore we cannot rely upon any ſubterranean fire for the maintenance of our hot Bathes.

From the air this heat of Bathes cannot proceed, ſeeing it is neither hot in it ſelf, as hath been proved, nor can get any heat by motion, being of a thin liquid ſubſtance, which no attrition or colliſion can make hot. And as for aereal meteors, bred from exhalations, and kindled, as is imagined, by an Antiperiſtaſis: if they be bred in the air, they are not able to penetrate into the bowels of the earth, as hath been ſaid before: if in the earth, beſides the difficulty of finding room enough for ſuch pleatiful exhalations as thoſe muſt be which procure lightning and thunder, and the vanity of their Antiperiſtaſis to kindle theſe exhalations, as hath been ſhewed before; it is a ſufficient refutation to

take away the ſubject of the queſtion, that is, all ſubterranean fire, as I hope I have done; and then we need not diſpute about the means of kindling it, &c. theſe momentary meteors being produced only to kindle, and not to maintain this fire.

From the water no man will derive this fire, being a cold and moiſt Element, and apt to quench it; unleſs it be by dilating the ſeminary ſpirits of natural ſpecies; and then they concur with us, and renouncing the actual fire, do confirm our heat of fermentation.

From the earth ſome have imagined an inbred heat, *ingenitum terræ calorem*, whereby it ſeems they had ſome glimmering of this light which we have given, but have left it in as great obſcurity as the Antiperiſtaſis or Antipathy; and earth being a cold and dry Element, cannot be the cauſe of this heat, as it is earth.

So as it is manifeſt that naturally the Elements cannot procure this heat of Bathes; and by violent motion they can do as little. For the earth being immovable, cannot be ſtirred by any violent motion; and the other three Elements, as Fire, Air, and Water, being thin and liquid ſubſtances, can procure no heat by any motion or colliſion either upon themſelves, or upon the earth; eſpecially in the bowels of the earth, where all is quiet, and no room or ſcope for any ſuch motion as this muſt be. So that neither the other three Elements, nor the earth, either in the whole, or in the parts, can be the cauſe hereof by any violent motion.

From mixt bodies if this heat come, it muſt be from

from animals, vegetables, or minerals. Animals are not so plentiful in the earth as to cause this heat of Bathes, either alive or dead. We read of subterranean animals which have both motion, and sense, and understanding, in *Vincentius in speculo naturali*; in *Lactantius*; in *Agricola, de animantibus subterraneis*; in *Bellonius, Ortelius, Paracelsus, &c.* who calls them *Gnomi*, the *Germanes Bergmaenlin*, the *French Rabat*, the *Cornish-men Fairies*. The *Danes* are generally perswaded that there are such creatures. But if any such living creatures be able to procure this heat, it cannot be by their hot complexions, but it must be by violence and striking of fire. Perhaps *Democritus* hath hired them to make his lyme there, or some other to erect forges for thunder, lightning, and such like fire-works.

Bronteſq; Steropeſq; & nudus membra Pyracmon.

But these opinions deserve no confutation.

From dead animals in their putrefaction some heat may appear, but such as neither for the degree, nor for the continuance, can be answerable to our Bathes.

For vegetables there is the same reason as for dead animals; neither doth the earth breed such plenty of these in her bowels, as to procure a months heat to a tun of water, in one place.

Wherefore we have nothing to ground upon but mineral substances, whereof the earth affords enough.

For there is no part of the earth but is replenished with mineral seeds. And although some may think that because minerals are not found,

or not wrought in all places: and that some waters are also found which do not participate of the virtues of minerals, that therefore our hot Bathes proceed not from the fermentation of minerals, but from some other cause; they are mistaken. For although metals are not frequent in some places, or at the least not discovered; yet a man shall hardly dig ten foot deep in any place, but he shall find rocks of stone, which have their generation as well as other minerals, or some of the Salts, or *Bitumina*, or Spirits, or mean metals, &c. And how can Bathes receive mineral qualities, but from minerals? Therefore where Bathes are, there must be Minerals, although where Minerals are, there are not always Bathes. But perhaps they are not so accumulated, as by their contiguity they are able to yield any manifest heat; their matter being dispersed as grains of corn sown in a field, which by reason of their lying single, do not shew a sensible heat in their fermentation; or most metals breeding between a Hanger and a Lieger, which *Agricola* calls *pendens* and *jacens*, are seldome above a foot thick, and therefore cannot yield much heat to our waters. And this is the cause why we have so few Bathes from Gold, Silver, Tin, Lead, &c. But where much matter is accumulated together, the very contiguity (one part lying upon another) will make a manifest heat, untill it grow to a *corpus continuum*, when the generation is perfected, and then the heat is extinguished. Or perhaps they have not water so plentifull as may yield a living spring, although they may have sufficient for the use of their generation. Or perhaps

haps where they break forth, they meet with desart sands, as in *Arabia, China, Africa, &c.* which drink up the water, and hinder the eruption of it. And whereas there are some hot springs found which do not shew any mineral quality in them, the reason of this may be the want of concrete juice, which, as I have said before, is the *medium* of communicating mineral qualities and substances with water. For without them, water is as unapt to imbibe minerals, as it is to unite with oyle. So as water may of it self receive actual heat from the fermentation of minerals, but not their qualities, without the mediation of some of the concrete juices: as contrariwise we find some Fountains that receive mineral qualities, and yet are cold: whereof I have given many examples. The reason whereof is either for that they have passed a long way, and by many Meanders from the place of generation to the place of their eruption, and so have lost their heat; or else the concrete juices, which will dissolve in water without any heat, being impregnated with other minerals, do impart them to water, and yet without heat. But to say that there is any earth without mineral seeds, is to make a *vacuum in rerum natura*, and to destroy the use of the Elements. It is true that the seeds do do not alwaies meet with opportunity to display themselves, and sometimes they are fain to serve under other colours, which are more predominant: but there is no part of the earth without some seeds or other.

And from hence we must derive the original of the actual heat of Bathes: for nothing else in the

the world will ſerve our turn to procure ſo laſting and ſo uniform a heat unto them; and that not by kindling any actual fire about them, for moſt of our minerals whereof our Bathes conſiſt, and from whence they receive both their actual heat and virtues, will not burn, neither have any actual heat in themſelves, being all cold to the touch, but receive it by a fermenting heat which they have in their generation: without which there is no generation for any thing. And this heat continues ſo long as the work of generation continues: which being once begun, doth not ceaſe in many ages, by reaſon of the plenty of matter which the earth yields, and the firmneſs and ſolidity thereof. And although after that the minerals have attained to their perfection, this heat ceaſeth, yet the generation extends further then where it firſt began, and enlargeth it ſelf every way, the works of nature being circular: ſo as the water which was heated by the firſt generation, cannot avoid the other ſucceeding generations, but muſt meet with them either behind or before, beneath or above, on the one ſide, or on the other (eſpecially ſeeing no generation can proceed without water:) and yet keeps the ſame tenor and degree of heat, according to the nature of the minerals fermenting, and to the diſtance from the place of eruption. And this is a far more probable cauſe of the continuance of our Bathes, then any ſubterranean deſtructive fire can be, or any other of the ſuppoſed cauſes can yield. I do not deny but that hot Bathes may ceaſe and become cold; as *Ariſtotle* ſaith of Salt Fountains which are cold, that they

2 *Meteorol. c.* 2.

they were once hot, before the original of their heat was extinct: which I interpret to be when the work of generation ceased, and the Salt brought to his perfection. But I do not read of any hot Bathes that have ceased: unless near unto some Vulcano, where either the sinking of Rocks hath altered the course of them, as at *Tripergula* and *Baia*, or the flaming fire which heated them at their eruption being extinguished, as in the *Æolian* Islands. These Vulcanoes are far more subject to decay then our generative heat, because they consume their fuel; this doth not, but increaseth it daily, *vires que acquirit eundo*. Of the other *Ovid* saith,

Nec quæ sulphureis ardet fornacibus Ætna
Ignea semper erit; neq; enim fuit ignea semper.

Ætna with its sulphureous flames will dy,
And as a kindling had, will want supply.

But of this we can hardly bring an Instance of any that have decayed; because where a generation is begun, there seldome or never wants matter to propagate and enlarge it. And seeing minerals have not their seeds in their individuals, as animals & vegetables have, but in their wombs, as hath been shewed before; it were to be feared that there would be a decay of mineral species, and so a *vacuum* left in nature, if these generations should be no more durable then the other. Animals are propagated by begetting of their species, the power whereof is in every individual, which, no doubt, will not give over this

this trade as long as the world lasteth. Vegetables are also fruitfull in their kinds, every one producing 100, or perhaps 1000 seeds of individuals yearly, to perpetuate their species. Minerals have no such means, but only have their seeds in their wombs, whereby they are propagated: and if these generations, being longer in perfecting of their species, were not supplyed with a larger extent for their productions; nature had been defective in not providing sufficient means for their perpetuity, as well as for others, and might easily suffer a decay, and a vacuity of mineral species; which agrees not with the providence of nature, and the ornament of the world. The necessity hereof depends upon the first benediction, (*crescite & multiplicamini*) which, no doubt belongs as well to minerals in their kinds, as it doth to animals and vegetables, and by vertue hereof we see that they are propagated daily, as I have proved before, Cap. 11. And this is that necessity whereof *Hypocrates* speaks, and that *fatum naturale inhærens rebus ipsis*, Natural fate inherent in things themselves, as *Lipsius* saith; and that *Lex Adrastiæ* mentioned by *Aristotle* and *Galen*, *Locis ante citatis*, so firmly established, as nothing can contradict it. Arithmetick, Geometry, and Logick, which are but attendants upon nature, have their principles so firmly grounded, as nothing can shake them; and shall we think that nature it self is grounded upon weaker foundations? wherefore we need not doubt of the perpetuity of these generations, but that as some parts attain to their perfection, so other

Trismegistus in Asclepio. c. 7. In Pimandro cap. 1.

Lib. de consiat.

parts

parts will be alwayes *in fieri* or *in via ad generationem*: whereby our Bathes will never fail of their heat or their virtues.

This I hope is sufficient for the confuting of other opinions, and the clearing of mine own from all absurdities concerning the degree of heat, which is as much as the nature of water can endure without utter dissipation: concerning the equal tenor of the heat, the duration of it, the participation of mineral qualities, &c. The other kind of confirmation which we call Apodeictical, is also here and there dispersed in this Discourse: as that all minerals have their continual generation: that this generation is not without heat and moysture, which do necessarily attend all generations: that few mineral substances or qualities can be imparted to water, but whilst they are in generation, and yet we find them much impregnated with them: that our Miners do find an actual heat, and in a high degree, in the digging of Minerals, where the fermentation is not throughly extinct: that we observe the like course of nature in the generations of animals and vegetables: that we are led to the acknowledgement hereof by many artificial conclusions and artifices, &c. Wherefore I forbear to make any larger repetition hereof.

And this is in brief (though plainly delivered) my opinion concerning the actual heat of Baths, and of the mineral qualities which we find in them; which I refer to the censures of those that be learned.

There are two other motions which resemble this fermentation: The one is *Motus dilatationis*, the

the other *Antipatheticus*. *Motus dilatationis* is evident in Lime, in Allum, in Copperas, and other concrete juyces, whereby the affusion of water, the Salt in the Lime, or the concrete juyces being suddenly dissolved, there is by this motion, an actual heat procured for a time, able to kindle any combustible matter put to it.

The like we observe in those stone Coals, called metal Coals, which are mixed with a Marchesit containing some mineral juyce, which receiving moysture, doth dilate it self, and grows so hot, as oftentimes great heaps of those Coals are kindled thereby, and burnt before their time; as hath been seen at *Puddle-Wharf* in *London*, and at *Newcastle*. But this is much different from our fermentation.

Another *Motus* resembling this fermentation, is that which is attributed to Antipathy, when disagreeing substances being put together, do fight, and make a manifest actual heat; as Antimony and Sublimat, oyle of Vitriol and oyle of Tartar, Allum liquor and Urine, Lees, Chalk, &c. But the reason of this disagreement is in their Salts, whereof one is astringent, the other relaxing; the one of easie dissolution in water, the other of hard dissolution, &c. where one mineral hinders the dissolution or congelation of another; and not by reason of any antipathy: for it is not likely that nature would produce two contrary substances mixed like atomes in one subject, but that in their very generations the one would be an impediment to the other. So in vegetables where one plant sucks away the nourishment from another, we call it antipathy. But

if we examine aright what this ſympathy and antipathy is, we ſhall find it to be nothing but a refuge of ignorance, when not being able to conceive the true reaſons of ſuch actions & paſſions in natural things, we fly ſometimes to indefinite generalities, and ſometimes to this inexplicable ſympathy and antipathy; attributing voluntary, and ſenſitive actions and paſſions to inſenſible ſubſtances. This *motus* alſo is much different from fermentation, as may eaſily appear by the former deſcription. And thus much for this point of fermentation, which I hope will give better ſatisfaction then any of the former opinions.

CHAP. XV.

By what means it may be diſcovered what minerals any water containeth.

THE nature of minerals and their generations being handled, and from thence the reaſons drawn, both of the actual heat of Bathes, and of their qualities: Now it is fit we ſhould ſeek out ſome means how to diſcover what minerals are in any Bath, that thereby we may the better know their qualities, and what uſe to make of them for our benefit. Many have attempted this diſcovery, but by ſuch weak means, and upon ſuch poor grounds, as it is no marvail if they have failed of their purpoſe: for they have contented themſelves with a bare diſtillation or evaporation of the water, and obſerving the

the ſediment, have thereby judged of the minerals, unleſs perhaps they find ſome manifeſt taſte, or ſmell, or colour in the water, or ſome unctuous matter ſwimming above it. Some deſire no other argument of Sulphur and Bitumen, but the actual heat: as though no other minerals could yield an actual heat, but thoſe two: But this point requires better conſideration; and I have been ſo large in deſcribing the natures and generations of minerals, becauſe without it, we cannot diſcern what minerals we have in our waters, nor judge of the qualities and uſe of them.

Our Minerals therefore, are either confuſed or mixed with the water. If they be confuſed they are eaſily diſcerned: for they make the water thick and pudly, and will either ſwim above, as Bitumen will do, or ſink to the bottom, as Earth, Sulphur, and ſome terreſtrial juices; for no confuſed water will remain long unſeparated. If they are perfectly mixed with the water, then their mixture is either corporal, where the very body of the Mineral is imbibed in the water, or ſpiritual, where either ſome exhalation, or ſpirit, or tincture is imparted to the water.

Corporally there are no minerals mixed with water, but juices, either liquid, as *ſuccus lapideſcens, metalliſicus*, &c. before they are perfectly congealed into their natural conſiſtence, or concrete, as Salt, Nitre, Vitriol, and Allum. theſe concrete juices do not diſſolve themſelves in water, but oftentimes bring with them ſome tincture or ſpirit from other Minerals. For as water is apt to recive juices, and tinctures, and

ſpirits

ſpirits from animals, and vegetables; ſo are concrete juices, being diſſolved, apt to extract tinctures and ſpirits from minerals, and to communicate them with water. And there are no Mines, but have ſome of theſe concrete juices in them, to diſſolve the materials of them, for their better union and mixture: and there are few minerals or metals, but have ſome of them incorporated with them; as we ſee in Iron, and Copper, and Tin, and Lead, &c. And this is the reaſon that water being long kept in Veſſels of any of theſe metals, will receive a taſte or ſmell from them, eſpecially if it be attenuated, either by heat, or by addition of ſome ſour juice; and yet more, if the metals be fyled into powder as we ſee in making Chalibeat Wine, or Sugar of Lead, or Puttie from Tin, or Verdegreaſe from Copper. There may be alſo a mixture of ſpiritual Subſtance from minerals, whilſt they are in generation, and *in Solutis Principiis*: the water paſſing through them, and the rather if it be actually hot, for then it is more apt to imbibe it, and will contain more in it, being attenuated by heat, then being cold; as we ſee in Urins, which though they be full of humours, yet make no great ſhew of them ſo long as they are warm, but being cold, do ſettle then to the bottom.

Theſe ſpiritual ſubſtances are hardly diſcerned in our Baths, but by the effects; for they leave no reſidence after evaporation; and are commonly as volatile in ſublimation as the water it ſelf: neither do they increaſe the weight of the water, nor much alter the taſte or ſmell of them, unleſs they be very plentiful. Wherefore we have no

certain way to discover them, but by the effects. We may conjecture somewhat of them by the Mines which are found near unto the Bathes, and by the mud which is brought with the water. But that may deceive, as coming from the passages through which the water is conveyed, or, perhaps, from the sweat and strigments of mens bodies which bathe in them. The corporal substances are found, either by sublimation or by precipitation. By sublimation, when being brought to the state of congelation, and sticks of Wood put into it, within a few dayes, the concrete juices will shoot upon the wood; in Needles, if it be Nitre; in Squares, if be Salt; and in Clods and Lumps, if it be Allum or Coperass, and the other mineral substances which the waters have received, will either incorporate a tincture with them, or if it be more terrestrial, will settle and separate from it, and by drying it at a gentle fire, will shew from what house it comes, either by colour, taste, smell, or vertue: There is another way by precipitation, whereby those mineral substances are stricken down from their concrete juices which held them, by addition of some oppofite substance. And this is of two sorts: either Salts, as Tartar, Soap-ashes, Kelps, Urine, &c. Or sour juices as Vinegar, Lemons, oyle of Vitriol, Sulphur, &c. In which I have observed that the Salts are proper to blew colours, and the other to red; for example, take a piece of Scarlet cloath, and wet it in oyle of Tartar (the strongest of that kind) and it presently becomes blew: dip it again in oyle of Vitriol, and it becomes red again. *Pe-*

nons

notus hath a strange precipitating water from Tin, Mercury, Alkali, &c. which separate any minerals, *Paracelsus authorum.*

These are the chief grounds of discovering mineral waters, according to which any man may make tryal of what waters he pleaseth. I have been desirous heretofore to have attempted some discovery of our Bathes, according to these principles: but being thought (by some) either not convenient, or not usefull, I was willing to save my labour, which perhaps might have seemed not to be worth thanks; and in these respects am willing now also to make but a bare mention of them.

CHAP. XVI.

Of the use of Mineral Waters, inwardly, outwardly. In this Chapter is shewed the inward use of them, first in general; then particuly of the hot waters of Bathe.

THE nature and generations of Minerals being handled, and how our mineral waters receive their impressions, and actual heat from thence; and by what means they are to be tried, what Minerals are in each of them. Now we are to shew the uses of them; which must be drawn from the qualities of the Minerals whereof they consist; which are seldome one or two, but commonly more. These qualities are either the first, as hot, cold, moyst, and dry; or the second, as penetrating, astringent, opening, resolving, attracting, cleansing, mollifying, &c.

For the first qualities, it is certain and agreed upon by all Authors, that all mineral waters do dry exceedingly, as proceeding from earth; but some of those do cool withall, and some do heat.

Cooling waters are good for hot distempers of the Liver, Stomach, Kidneys, Bladder, Womb, &c. Also for Salt distillations, sharp humours, light obstructions of the Meseraicks, &c.

Heating waters are good for cold affects of the Stomach, Bowels, Womb, Seminary Vessels, cold distillations, Palsies, &c.

For the second qualities, cleansing waters are good in all Ulcers, especially of the Guts.

Mollifying waters, for all hard and schirrous Tumors.

Astringent waters, for all Fluxes, &c. and so of the rest.

Now, these waters are used either inwardly or outwardly.

Inwardly, either by mouth, or by injection.

By mouth, either in potion, or in Broths, Juleps, &c.

6 *De tuenda sanitat. cap. 9.*

Galen never used them inwardly, because he judged their qualities to be discovered by experience, rather then by reason. And seeing we find many of them to be venomous, and deadly, as proceeding from Arsenick, Sandaracha, Cadmia, &c. we had need be very wary in the inward use of them.

Neptunes Well in *Tarracina* was found to be so deadly, as it was therefore stopped up. By *Monpellier* at *Perant* is a Well which kills all the Fowls

Fowls that drink of it; the lake *Avernus* kills the Fowls that fly over it; ſo doth the vapour ariſing from *Charons* Den between *Naples* and *Puteolum*. So there are divers waters in *Savoy* and *Rhetia*, which breed ſwellings in the throat. Others proceeding from *Gipſum* do ſtrangle, &c. But where we find waters to proceed from wholeſome Minerals, and ſuch as are convenient, and proper for our intents, there we may be bold to uſe them as well inwardly as outwardly: yet ſo as we do not imagine them to be ſuch abſolute remedies, as that they are of themſelves able to cure diſeaſes without either rules for the uſe of them, or without other helps adjoyned to them. For as it is not enough for a man to get a good Damaſco or Bilbo-blade to defend himſelf withall, unleſs he learn the right uſe of it from a Fencer; ſo it is not enough to get a medicine and remedy for any diſeaſe, unleſs it be rightly uſed, and this right uſe muſt come from the Phyſitian, who knows how to apply it, and how to prepare the body for it, what to add and joyn with it, how to govern and order the uſe of it, how to prevent ſuch inconveniences as may happen by it, &c.

Wherefore, where we ſpeak of any Mineral water, or of any other medicine that is proper for ſuch and ſuch a grief, we muſt be ſo underſtood, that the medicine is not wiſe enough to cure the diſeaſe of it ſelf, no more than a ſword is able of it ſelf to defend a man, or to offend his enemie, but according to the right and skilfull uſe of it. And as it is not poſſible for a Fencer to ſet down abſolute rules in writing for his Art, whereby a man may be able in reading of

them to defend himself; no more is the Physitian possibly able to direct the particular uses of his remedy, whereby a patient may cure himself without demonstration and the particular direction of the Physitian. It is true, that we have general rules to guide us in the cure of diseases, which are very true and certain; yet when we come to apply them to particular persons, and several constitutions, these general rules are not sufficient to make a cure, but it must be varied according to substance. Hereupon we daily find, that those patients which think to cure themselves, out of a little reading of some rules or remedies, are oftentimes dangerously deceived. And this is enough to intimate generally concerning the uses of our Mineral waters.

Inwardly we find great and profitable use of such waters as proceed from Nitre, Allum, Vitriol, Sulphur, Bitumen, Iron, Copper, &c. Examples whereof I have set down before in the several Minerals, referring the particular uses of each to such Authors as have purposely described them.

Baths of *Bath* consist principally of Bitumen, with Nitre, and some Sulphur.

My intent is chiefly to apply my self to those Baths of *Bath* in *Somersetshire*; which consisting, as I judge, principally of Bitumen, with Nitre, and some Sulphur, I hold to be of great use both inwardly and outwardly. And I am sorry that I dare not commend the inward use of them as they deserve, in regard I can hardly be perswaded that we have the water pure, as the springs yield them, but do fear, lest where we take them, they may be mixt with the water of the Bath. If this doubt were cleared, I should

not

not doubt to commend them inwardly, to heat, dry, mollifie, discuss, glutinate, dissolve, open obstructions, cleanse the kidneys and bladder, ease cholicks, comfort the matrix, mitigate fits of the mother, help barrenness proceeding from cold humors, &c. as *Talernomontanus* affirms of other Bituminous Baths. Also in regard of the Nitre, they cut and dissolve gross humors, and cleanse by urine. In regard of the Sulphur, they dry and resolve, and mollifie, and attract, and are especially good for uterine affects proceeding from cold and windy humours.

Thesauri aquarii pag. cap. 40.

And I would wish these waters to be drunk hot as they are, for better penetration, and less offence to the stomach. The antient Grecians and Romans did drink most of their water and wine hot, as we find in many Authors, which *Salmuth* hath diligently collected: and *Anthonius Percius* hath purposely written a book of it, entituled *Del bever caldo costumato da gli Antichi*. We find also that it is in use at this day, both in the *East-Indies* and in *Turkey*, where they have a drink called *Capha*, sold ordinarily in Taverns, and drunk hot, although in the Summer. *Verulamius* doth marvel that it is so much grown out of use, and adviseth to drink our first draught at our meals, hot. There is great reason for it, both for preservation of health, and for cure of many diseases. The stomach being a nervous part, must needs be offended by that which is actually cold: and being the seat of natural appetite, and of the first concoction (whose errors and defects are not amended in the other concoctions) had need to be preserved in his native

In Pancirollum de deperditis pag. 540.

Prosper. Alpinus de medic. Aegyptiacum l. 4. c. 3. De vita & morte pag. 304.

Warm drink commended.

vigour

vigour and ſtrength, that it may breed good nouriſhment for the whole body. But the much uſe of cold drink, although it ſeem to refreſh us for the preſent, by dulling the appetite and the ſenſe of thirſt and hunger, as a ſtupefactive narcotick will do: yet it deſtroys the faculties of the ſtomach, which are maintained and quickned by heat: and thereby breeds crudities in our bodies, from whence many diſeaſes proceed. The *Eaſt-Indians* are ſeldome troubled with the Stone or the Gout, and it is imputed to their warm drink: the like we may judge of obſtructions, cholicks, dropſies, rheumes, coughs, hoarſneſs, diſeaſes in the throat and lungs, &c. in which caſes, and many more which proceed from ill concoction and crudity of humors, no doubt it is an excellent preſervative to drink our drink warm. I know a worthy Gentleman of excellent parts, who in his travels obſerved the benefit hereof, and for many years hath uſed to take his drink hot: and being now above 80 years old, enjoyeth his health of body, and vigour of ſpirits, beyond the ordinary courſe of men of his age. Likewiſe in the cure of diſeaſes, I perſwade my ſelf it would prove very profitable, if it were in uſe. For example in feavers, I ſee no reaſon but it would do more good than our cold waters, juleps, poſſet-drinks, &c. which I approve well of, but if the patient did drink them hot, the ſtomach would be leſs offended thereby, the moyſture (which we chiefly deſire in them) would penetrate more, and the eventilation by ſweat or inſenſible tranſpiration, would not be hindred. *Hypocrates* is very plain in this point, and reckons

I. W.

Lib. de humidorum uſu.

reckons many inconveniences of cold drinks, to the teeth, bones, nerves, breſt, back, lungs, ſtomach, &c. I will not inſiſt longer hereupon, being a practical point of Phyſick: only I thought good to intimate it to our learned Phyſitians to contemplate upon, for the benefit of our patients.

Our *Bath* Guides do uſually commend the drinking of this water with ſalt to purge the body, perſwading the people that the *Bath*-water hath a purging quality in it, when as the ſame proportion of ſpring-water, with the like quantity of ſalt will do the like. Our Baths have true virtues to commend them, ſo as we need not ſeek to get credit or grace unto them by falſe ſuggeſtions. The Bitumen and Nitre which is in them, although it ſerves well for an alterative remedy, yet it is not ſufficient for an evacuative: and therefore we muſt attribute this purgative quality, either to the great quantity of water which they drink (and ſo it works) *ratione ponderis*) or unto the ſtimulation of ſalt which is diſſolved in it, or unto both together. Our common ſalt hath a ſtimulating quality, as is ſhewed before, Chap. 7. and *Eraſtus* ſaith that it purgeth much. *Bulcaſis* gives it to that purpoſe from 3 *ij* to 3 *iiij*. *Meſue* alſo preſcribes it to purge groſs humors, and ſo doth *Avicen.* Wherefore there is no doubt but ſalt will purge of it ſelf, being diſſolved in our *Bath*-water. But I ſhould like much better to diſſolve in it ſome appropriate ſyrup or other purgative, for this purpoſe, as Manna, Tartar, Elaterium, ſyrups of Roſes, of Cichory, with Rhubarb, Auguſtanus; or to move

Simpl. cap. 16. lib. 5. ſum 1. tract. 4. & lib. 2. tract. 2. cap. 624.

move urine, *Syr. de 5. rad. Bizantinus de Limonibus, Sambucinus, de Althea, &c.* And this course is usual in *Italy*, according as the Physitian sees most convenient, but with this caution, that when they take it in potion, they must not use the *Bath*, because of contrary motions.

Baccius lib. 2. Claudinus p. 377. De aere, aquis & locis.

Inwardly also *Bath*-waters are used, for Broths, Beer, Juleps, &c. although some do mislike it, because they will not mix medicaments with aliments: wresting a text in *Hypocr.* to that purpose. But if we may mix Diureticks, Deoppilatives, Purgatives, &c. with aliments, as usually we do: I see no reason but we may as well use mineral waters, where we desire to make our aliments more alterative by a medicinal quality, alwaies provided that there be no malignity in them, nor any ill quality which may offend any principal part. And thus much for the use of them by mouth.

By injection they are used also into the Womb, to warm, and dry, and cleanse those parts; into the passages of urine, to dry and heal excoriations there; into the fundament for like causes, as also for resolutions of the Sphincter, and bearing down of the fundament, &c. And thus they are used either alone, or mixed with other medicines, according as the Physitian thinks most fit, and we daily find very good success thereby in uterine affects, depending upon cold causes. Thus much for the inward use of our *Bath*-waters.

CHAP.

CHAP. XVII.

Of the outward use of the the Hot Waters of Bathe; *first, the general use of them to the whole body in Bathing: secondly, the particular use of them by pumping, bucketing, or applying the mud.*

OUtwardly our Bath-waters are principally used, because they are most properly for such affects as are in the habit of the body, and out of the veins: as Palsies, Contractions, Rheums, cold Tumors, affects of the skin, aches, &c. And in these cases we use not only the water, but also the mud, and in some places the vapour.

The water is used both for his actual and potential heat, as also for the second qualities of mollifying, discussing, cleansing, resolving, &c. which the minerals give unto it. The use hereof is either general to the whole body, as in bathing; or some particular to some one part, as in bucketing or pumping, which antiently was called *Stillicidium*. The *Italians* call it *Duccia*. The general use in Bathing, is most antient: for our Bathes were first discovered thereby to be wholsome and soveraign in many diseases.

Nechams Verses concerning the use of these Bathes, are four hundred years old.

Bathoniæ Thermas vix præfero Virgilianas
Confecto prosunt Balnea nostra seni:
Prosunt attritis, collisis invalidisque,
Et quorum morbis frigida causa subest.

Which

Which I will English out of Dr. *Hacknels* learned work of the perpetuity of the world.

Our Bains at Bathe with *Virgils* to compare;
For their effects, I dare almost be bold,
For feeble folk, and crazie good they are,
For bruiz'd, consum'd, far spent, and very old,
For those likewise whose sickness comes of cold.

We have antient traditions (*fama est obscurior annis*) That King *Bladud* who is said to have lived in the time of *Elias*, did first discover these Bathes, and made tryal of them upon his own Son, and thereupon built this City, and distinguished the Bathes, &c. But we have no certain record hereof. It is enough that we can shew the use of them for 400 years, and that at this day they are as powerful as ever they were; *Cambden* gives them a more antient date from *Ptolomy* and *Antonine*, and the *Saxons*: and saith they were called *Aquæ Solis*, and by the *Saxons*, *Akmanchester*, that is, the town of sick people, and dedicated to *Minerva*, as *Solinus* saith. The opinion that the Bathes were made by Art, is too simple for any wise man to believe, or for me to confute; And *Necham* in his Verses which follow after those I have mentioned, doth hold it a figment: you may see them in *Cambden*. We have them for their use in bathing, distinguished into four several Bathes, whereof three have been antiently; namely the KingsBath, the Hot Bath and the Cross Bath. The Queens Bath was taken from the Springs of the Kings Bath, that being farther off, from the hot Springs, it might serve

serve for such as could not endure the heat of the other. We have likewise an appendix to the hot Bath, called the Leapers Bath, for unclean persons. We find little difference in the nature of these Bathes, but in the degree of heat, proceeding no doubt, from one and the same Mine. Yet as the Mine may be hotter in one part then in another, or the passages more direct from it, so the heat of them may vary. Some little difference also we find among them, that one is more cleansing then another, by reason (as I take it) of more Nitre. For in the cross Bath we find that our fingers ends will shrink and shrivel, as if we had washed in Soap-water, more then in the other Bathes. The Kings Bath, as it is the hottest of all the Bathes, so it is the best for very cold diseases, and cold and phlegmatick constitutions: And we have daily experience of the good effects it worketh upon Palsies, Aches, Sciatica's, cold Tumors, &c. both by evacuation, by Sweat, and by warming the parts chilled, attenuating, discussing, and resolving the humors: Also in Epilepsies and Uterin affects in the Scorbute, and in that kind of dropsie which we call Anasarca. The hot Bath is little inferiour unto it, as next in degree of heat, and doth fill in the same cases. The Queens Bath, and Cross Bath are more temperate in their heat, and therefore fittest for tender bodies, which are apt to be inflamed by the other, and where there is more need of mollifying and gentle warming, then of violent heat and much evacuation by sweat. And in these Bathes they may tarry longer without dissipation of Spirits, then

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in the other: the Queens Bath is the hotter of the two, but temperate enough for most bodies. The Cross Bath is the coldest of all, as having but few Springs to feed it; yet we observe it to supple, and mollifie more then the rest, both because they are able to stay longer in it, and because (as I said before) it seems to participate more with Nitre, then the rest, which doth cleanse better, and gives more penetration to the other Minerals. Wherefore in contractions, Epilepsies, Uterin affects, Convulsions, Cramps, &c. This Bath is very useful, as also in cutaneal diseases, as Morphews, Itch, &c. Thus much for the nature and difference of our Bathes, and the general use in bathing.

They are used also to particular parts by pumping or bucketing, or applying the mud.

Pumping or bucketing are not used in that fashion, as we use them in any other Bathes that I can learn, but only the Duccia or Stillicidium. But I hold our fashion as good as that. The water comes more plentifully upon the part, and may be directed as the patient hath occasion. Our bucketing hath been longest in use: but finding that it did not heat some sufficiently, being taken from the surface of the Bath, we have of late erected Pumps, which draw the water from the springs or near unto them, so as we have it much hotter from thence, then we can have it by bucketing. A worthy Merchant and Citizen of *London*, Mr. *Humphrey Brown*, was perswaded by me to bestow two of these Pumps upon the Kings and Queens Bath, whereby he hath done much good to many, and deserves a thankful remembrance

remembrance. The like also I procured to be done at the other Bathes, although that of the Cross Bath is not so useful, by reason it wants heat, unless for yong Children. Also we have a Pump out of the hot Bath, which we call the dry Pump, where one may sit in a Chair in his Cloaths, and have his Head, or Foot, or Knee pumped without heating the rest of the body in the Bath; and devised chiefly for such as have hot Kidneys, or some other infirmities which the Bath might hurt. This we find very usefull in Rheums, and cold Brains, and in Aches and Tumors in the Feet. For these Pumps we are beholding unto the late Lord Archbishop of *York*, and to Mr. *Hugh May*, who upon my perswasions were contented to be at the charge of them. It were to be wished that some well disposed to the publick good, would erect the like at the Kings Bath; † where, perhaps, it might be more usefull for many, in regard of the greater heat which those springs have.

† This is now done, and a dry Pump there erected in the year 1661. at the City charge, by the procurement of Mr. *John Ford*, Apothecary, then Mayor of the City.

The Iute of Bathes is in much use in some places, where it may be had pure, both to mollifie, and to resolve, and to strengthen weak parts. But we make little use of it in our Bathes, because we cannot have it pure, but mixed with fragments. In divers other places either the springs arise a good distance from the bathing places, or else there be other eruptions from whence it may be taken. But our springs arising in the Bathes themselves, it cannot well be saved pure. Besides, we have not those means of the heat of the Sun, to keep it warm to the parts where it is applyed: so as growing cold, it

rather

rather does hurt then good. Wherefore it were better for us, to use artificial lutes, as the Antients did, of Clay, Sulphur, Bitumen, Nitre, Salt, &c. or unguents of the same nature, as that which they call Ceroma. But the best way is to refer the election of these remedies to the present Physitian, who will fit them according to the nature of the grief.

CHAP. XVIII.

In what particular Infirmities of the Body, bathing in the Hot Waters of Bathe *is profitable.*

TO come more particularly to the use of bathing, we must understand, that there are many mineral waters fit for bathing, which are not fit to drink: as those which participate with Lead, Quicksilver, Gypsum, Cadmia, Arsenick, &c. Also those that contain liquid Bitumen, are thought to relax too much: but those that proceed from dry Bitumen are permitted, and prescribed in potion by *Paulus Ægineta*, and *Trallian*: Sulphur also is questioned, whether it be fit to be taken inwardly by Potion, because it relaxeth the stomach, and therefore *Aetius* forbids it: yet *Trallian* allows it, and so do others, if the Sulphur be not predominant. But for outward bathing there is no question to be made of these Minerals, nor of any other which are not in themselves venomous.

1 *Tetrab. serm.* 3 *cap.* 167. *Trallian. l.* 10. *cap.* 1.

And

And whereas *Oribasius*, *Ægineta*, *Actuarius*, *&c.* are suspitious of Sulphur and Bitumen for the head: they must be understood of hot distempers there, and not of cold rheumatick brains; where by daily experience we find the profitable use of them, both by evacuation in bucketing, and by warming and comforting the cold part. And *Oribasius* doth ingeniously confess, that the nature of these Baths was not then perfectly discovered; and therefore they were all held to be, not only dry, but very hot; although we find them not all so: for Iron waters do cool, and so do those of Camphir, and Alluminous, and Nitrous waters also. But for our Bituminous and Sulphurous waters which *Galen* forbids in hot brains, there is no reason to suspect them in cold affects of the brain and nerves, in which cases we make especial choice of all things, which either in tast or smell do resemble Bitumen: as Rue, Castorium, *Valeriana*, *Herba Paralyseos*, *Trifolium*, *Asphaltitis*, *&c.* which both by his warming quality, and by his suppling and mollifying substance, is most proper and convenient for those parts. The like I may say of Sulphur, in which nothing can be excepted against, but his sharp spirit, which is made by burning: and we have none of that in our waters, nor I hope any fire to make it withal. The other parts of Sulphur are hot and dry, and very unctuous. As for Nitre, it cleanseth, purgeth both by stool and urine, and helpeth the incorporation of the other Minerals with the water, and qualifies the heat of them, and gives them better penetration

Orib. l. 10. c. 3.
Ægin. l. 1. c. 52.
Actu. l. 3. c. 10.
Cap. 5.
Hypoc. de aere, aquis, & locis.
6. de tuenda sanitate cap. 9.

into our bodies. In regard of these Minerals, together with the actual heat, we find that the bathing in our *Baths* doth warm the whole habit of the body, attenuate humors, open the pores, procure sweat, move urine, cleanse the matrix, provoke womens evacuations, dry up unnatural humors, strengthen parts weakned, comfort the nerves, and all neutrous parts, cleanse the skin, and suck out all salt humours from thence, open obstructions, if they be not too much impacted, ease pains of the joynts and nerves and muscles, mollifie and discuss hard tumors, &c. Wherefore this bathing is profitable for all palsies, apoplexies, caros, epilepsies, stupidity, defluctions, gouts, sciaticaes, contractions, cramps, aches, tumors, itches, scabs, leprosies, cholicks, windyness, whites in women, stopping of their courses, barrenness, abortions, scorbuts, anasarcaes, and generally all cold and phlegmatick diseases, which are needless to reckon up. In all which cures our *Baths* have a great hand, being skilfully directed by the Physitian, with preparation of the body before, and addition of such other helps as are needfull. And whereas without the help of such Baths, these diseases could not be cured without tormenting the body, either by fire, or lancing, or caustick, or long dyets, or bitter and ungrateful medicines, &c. In this course of bathing, all is pleasant and comfortable, and more effectual than the other courses, and therefore it is commonly the last refuge in these cases, when all other means fail. I will not undertake to reckon up all the benefits which our Baths do pro-

promiſe; but if we had a regiſter kept of the manifold cures which have been done by the uſe of our Baths principally, it would appear of what great uſe they are. But as there is a defect in not keeping a Catalogue of rare Cures, ſo many perſons of the better ſort would be offended, if a Phyſitian ſhould make any mention of their cures or griefs: wherefore I muſt ſpeak but generally.

CHAP. XIX.

The manner of bathing, chiefly referred to the inſpection and ordering of a Phyſitian. Yet ſome particulars touched concerning the government of the patient in and after bathing; the time of day, of ſtaying in the Bath, *of continuing the uſe of it, The time of the year. Of covering the* Baths.

NOw for the manner of bathing, I will not ſet down what the Phyſitian is to do, but leave that to his judgement and diſcretion: but what is fit for the patient to know: for there are many cautions and obſervations in the uſe of bathing, drawn from the particular conſtitutions of bodies; from the complication of diſeaſes, and from many other circumſtances which cannot be comprehended in general rules, or applyed to all bodies alike: but many times upon the ſucceſs,

ceſs, and the appearing of accidents, the Phyſitian muſt *ex re nata capere conſilium*, and perhaps alter his intended courſe, and perhaps change the *Bath* either to a hotter or cooler, &c. In which reſpect, thoſe patients are ill adviſed which will venture without their Phyſitian upon any particular Bath, or to direct themſelves in the uſe of it: And this is a great cauſe that many go away from hence without benefit, and then they are apt to complain of our Baths, and blaſpheme this great bleſſing of God beſtowed upon us.

It is fit for the patient when he goeth into the *Bath*, to defend thoſe parts which are apt to be offended by the *Bath*: as to have his head well covered from the air and wind, and from the vapours ariſing from the *Bath*: alſo his kidneys (if they be ſubject to the Stone) anointed with ſome cooling unguents; as *Roſatum Comitiſſæ*, *Infrigidans Galeni*, *Santolinum*, *&c.* Alſo to begin gently with the *Bath*, till his body be inured to it, and to be quiet from ſwimming, or much motion, which may offend the head by ſending up vapours thither: at his coming forth, to have his body well dryed, and to reſt in his bed an hour, and ſweat, &c.

A morning hour is fitteſt for bathing, after the Sun hath been up an hour or two; and if it be thought fit to uſe it again in the afternoon, it is beſt four or five hours after a light dinner. For the time of ſtaying in the *Bath*, it muſt be according to the quality of the *Bath*, and the toleration of the patient. In a hot Bath, an hour or

leſs

leſs may be ſufficient: in a temperate Bath, two hours. For the time of continuing the Bath, there can be no certain time ſet down, but it muſt be according as the patient finds amendment, ſometimes twenty daies, ſometimes thirty, and in difficult caſes much longer. And therefore they reckon without their Hoſt, which aſſign themſelves a certain time, as perhaps their occaſions of buſineſs will beſt afford. For the time of the year, our Italian and Spaniſh Authors prefer the Spring and Fall; and ſo they may well do in their hot Countreys; but with us, conſidering our climate is colder, and our Baths are for cold diſeaſes; I hold the warmeſt moneths in the year to be beſt; as *May*, *June*, *July*, and *Auguſt*, and I have perſwaded many hereunto who have found the benefit of it; for both in our Springs, and after *September* our weather is commonly variable, and apt to offend weak perſons, who finding it temperate at noon, do not ſuſpect the coolneſs of the mornings and evenings. Likewiſe in the Bath it ſelf, although the Springs ariſe as hot as at other times, yet the wind and air beating upon them, doth do them much harm, and alſo make the ſurface of the water much cooler than the bottom: and therefore *Claudinus* wiſheth all Baths to be covered, and *Fallopius* finds great fault with the Lords of *Venice*, that they do not cover their Bath at *Apono*. We ſee alſo that moſt of the Baths in *Europe* are covered, whereby they retain the ſame temperature at all times. And it were to be wiſhed that our Queens Bath, and Croſs-Bath, being ſmall Baths, were cover-

ed, and their Slips made close and warm. By this means our Baths would be useful all the year, when neither wind and cold air in Winter, nor the Sun in Summer should hinder our bathing. Moreover, for want of this benefit, many who have indifferently well recovered in the Fall, do fall back again in the winter before the Cure be perfectly finished: and as this would be a great benefit to many weak persons, so it would be no harm to this City, if it may be a means of procuring more resort hither in the Winter time, or more early in the Spring, or more late at the Fall.

I desire not novelties, or to bring in innovations, but I propound these things upon good grounds and examples of the best Baths in *Europe*, and so I desire to have them considered of, referring both this point, and whatsoever else I have said in this Discourse, to the censure of those who are able to judge.

I do purposely omit many things about the virtues and uses of our Baths, which belong properly to the Physitian, and cannot well be intimated to the patient without dangerous mistaking. For as *Galen* saith, our Art of Physick goes upon two legs, Reason and Experience; and if either of these be defective, our Physick must needs be lame. Experience was first in order:

De compos. med. s. locos l. 8. c. 7.

Per varios usus artem experientia fecit,
Exemplo monstrante viam.
From much Experience, th'Art of Physick came,
Directed by Example to the same.

Reason

Reaſon followed, which without Experience, makes a meer contemplative and theorical Phyſitian. Experience without Reaſon, makes a meer Emperick, no better than a Nurſe or an attendant upon ſick perſons, who is not able out of all the experience he hath, to gather rules for the cure of others. Wherefore they muſt be both joyned together: and therefore I refer Phyſitians works unto Phyſitians themſelves.

FINIS.

PHYLIS.

AN APPENDIX CONCERNING BATHE:

Wherein The
ANTIQUITY
Both of The
Bathes and City
Is more fully discours'd; with
a brief account of the Nature and Vertues of
the HOT WATERS there.

By *THO. GUIDOTT*, M. B. Practising at *BATH.*

Μὴ ἐν πολλοῖς ὀλίγα λέγε, ἀλλ' ἐν ὀλίγοις πολλά.

Pythag. apud Stob. Serm. 34.

Nunc Te marmoreum *pro tempore fecimus: at Tu,*
Si fatura gregem suppleverit, aureus *esto.* Virg. *Ecl.*

London; Printed for *Thomas Salmon* Book-seller, living in *Bath.* 1669.

TO MY

HONOURED

AND

Learned Friend,

JOHN MAPLETT,

Doctor in

PHYSICK.

SIR,

HAving had the happineſs in a ſtrange place to light on ſo good an acquaintance as your ſelf (whoſe Sober, Candid, and Impaſſionate temper receives an Additional to its native luſtre from the perfunctory, diſobliging, and illiterate Genius of others:) I could not but take the firſt opportunity to teſtifie my Reſpects; and the rather, becauſe having

having fallen on a Subject in which you may claim some right; I thought it not safe to enter your ground without your leave.

Besides, we are told by Solinus (*whose Assertion admits a further probability from the Epithetes of* Παιωνία, Λαοσσόος, Ὑγιὰ, Σωτῆρα, *&c. given her by* Pausanias, Plutarch, Aristides, *mentioned also in* Hesychius, Suidas, Harpocration, *and others, of which I have* * *elsewhere more largely treated in another Language, that* Minerva *was formerly the Patroness of these Baths; and what fitter person could I find out to address this brief Discourse of Baths unto, than him.*

* In Historia Æsculapii, ἀνακδότῳ.

——— Tritonia *Pallas,*
Quem docuit, multaq; insignem reddidit arte.

I have jointly discours'd of the Baths and City, which seem to me to resemble the two parts of a Compositum, Body and Soul: And as there is a more than ordinary respect due to the body, on the account of its being the Case and Cabinet of that pearl of great price, our more noble and diviner part, the Soul; So I thought it my Concern to make some reflections on the City also, as well as the Waters,

by

by which I think it doth in some measure appear, that it cannot justly be said of the Baths, what was once of the Wit of Galba the Roman Emperour lodg'd in a deformd body, that they have a bad habitation.

If I have not here drawn the Baths to the life, it may be considered that it was intended only for a rough draught, and (what is more) that I had not your Pensil. The thing it self, as to the Composure of it, is the hasty product of less than 14 daies, and those too in the middest of, and stollen from my other Employments; what therefore is wanting now, I hope hereafter to supply.

In the mean time, Sir, I humbly offer to your kind acceptance this small acknowledgement of my real respects, as to one whose higher season with Academical Studies, together with the helps and advantages of Travel, hath made a Pillar of your faculty, which your courteous disposition and civil Deportment, hath so nearly polish'd that you seem to have attain'd, if we believe the Poet, the utmost perfection, having in you that which doth at once, both delight and profit.

Omne tulit punctum, qui miscuit utile dulci. Hor. de Art. Poet.

As for those that are meer husks and outsides of Physitians, that desire to be thought to be what they are not, and are nothing less than what they seem to be; whose empty heads serve

serve for no other use than Rattles, only to make a pretty noise to please Children, whose mouths also are open Sepulchres, and they themselves little better than painted ones.

Non tali auxilio, nec defensoribus istis, &c.

We may well spare, or rather not spare them, as being not the true Sons, but the By-blows of Æsculapius.

Sir, I beg your pardon for giving you this trouble, and assure you, That

I Am

Your very Affectionate Friend,
and Humble Servant,

THOMAS GUIDOTT.

Bath, Oct. 24.
1668.

THE

THE

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I Shall not here Treat of the Antiquity and Nature of Baths in general, nor put you in mind of the Pool of *Bethesda*, or River of

Jordan, but intending a brief Discourse concerning *Bath*, both as to the City, and Hot waters there, Shall, without any further preface, begin with the Waters, afterwards proceed to the Antiquities of the City; and last of all, give a taste of the Nature and Virtues of the Baths.

That the Baths, or Hot waters of *Bath* in *Somerset-shire*, are of great Antiquity, cannot be doubted by any one who hath in the least cast an eye on antient Records. Many are the Opinions and Conjectures about the time of their discovery, which I shall as briefly as I may examine. And because there is very frequent mention made of King *Bladud*, and the Prophet *Elias*, the one as the Founder, the other as being discovered in his time: I think it may be for the satisfaction of some, if I give a particular account who this *Bladud* was, and upon what score the Prophet came to be concern'd in this business. The substance of which I take out of a Latine Manuscript intituled *Brutus Abbreviatus*, being an Epitome of a larger History, not concerning
G. M. my self much in the truth of the Relation, but leaving it to the judgements of those that shall peruse it, to determine of it as they shall think fit.

My rise I must take from *Brutus*, who after the destruction of *Troy*, is said to have come into this Island, then called *Albion*, about the year before our Saviours Nativity 1100. where finding none but Gigantick Inhabitants possessing the Hills, and seeing a fruitful soil, and full of delights, was pleased one day to call his Company together to offer a solemn Sacrifice to *Diana*, by whose

whose guidance and direction he had lighted on so pleasant an Island. But as they were all at Meat, thirty mighty Giants came down upon them, and in a short time slew as many of *Brutus* his men, yet were all afterwards quell'd by *Brutus* and the surviving Company, except one that was greater than the rest, whose name was *Gogmagog*.

Now *Brutus* had a Companion related to him called *Corineus*, who being not only like *Saul* from the shoulders upwards, but from the waste higher than his Brethren, was designed to undertake *Gogmagog*, in which Combat *Gogmagog* brake two of *Corineus* his ribs, who notwithstanding grasping the Giant in his arms, wafted him along the Sea-side, and threw him down a precipice, where he was dashed in pieces, whence that place now bears the name of *Gogmagog*'s leap.

Nephew, as some write.

Supposed to be the fall of *Dover* by some; by others, the *Haw* at *Plimmouth*.

On this *Corineus*, *Brutus* bestowed the adjacent Countrey, which he after his own name, called *Cornwall*. For the first arrival of *Brute* was at *Totnes* in *Devonshire*, so named *quasi Tout en ease*, i. e. *Totus in quiete*, from the great delight and recreations that place afforded. Afterwards, finding a more fruitful and noble place on the Thames, built there a City 390 years before that of *Rome*, which he called the City of *New Troy*, in memory of that *Troy* whence he and his progeny came: and having reigned here 20 years, he dyed, and was honourably buried at *New Troy*, or *Troia Nova*, now *London*.

Brutus had three Sons, *Loegrius* or *Locrinus*, *Albanactus*, and *Camber*, between whom he

parted this Iſland, *viz.* the Northern part, to wit, *Scotland*, he gave to *Albanactus*; the Southern part *Wales*, to *Camber*; and *England* to *Locrinus*.

Called therefore by the Welch, *Loygar*, & *Logiers*.

After ſome time, *Humbardus* King of *Humlandia*, came into *Scotland* with a great Army, and ſlew *Albanactus*; which his two Brethren, *Locrinus* and *Camber* hearing of, came with a conſiderable force to find him out, and coming upon him whilſt he was making merry, put him ſo to it, that having no way to eſcape, he drowned himſelf in the River *Humber*, to which he gave name.

Called by other Writers, *Hunys* or *Hunnys*, King of *Hunniſy* or *Scythia*, receiving the name of *Humber* or *Humbardus*, after his comeing into *Scotland*.

Humbardus had a daughter called *Eſtrilda*, whom *Locrinus* having taken captive in a ſhip, had a mind to make his wife, although he was before married to *Gwenthlea* daughter to *Corineus*, which accordingly he did, and left *Gwenthlea*. *Gwenthlea* being thus repudiated, returned into *Cornwall*, and as Heireſs to her Fathers right, took poſſeſſion of all the places there, and received homage from the Inhabitants; and raiſing an Army in her own defence, made war upon her Husband *Locrinus*, cut off him with his Army, and took Priſoners *Eſtrilda* and her daughter *Avana*; and drowning them in the River *Severn*, cauſed her ſelf to be crowned Queen. She had one Son by *Locrinus*, named *Mahan*, whom when he was of age, ſhe made King, her ſelf retiring into *Cornwall*, died there, and was interred with great pomp and magnificence.

Others write ſhe was daughter to a King of *Almaine*, and brought with two others thence by *Humbardus*.

Alias Gwendoleena.

Otherwiſe called *Habren*.

Mahan, the Son of *Locrinus* and *Gwenthlea*, had two Sons, *Memprice* and *Manlinus*, who fell out about the Crown. *Manlinus* treacherouſly ſlaying

Alias Madan & Madian.

slaying his elder Brother *Memprice*, aspired to the Throne, a wicked and lewd man, who sharing with *Cain* in the sin of murdering his Brother, partook also with him in his punishment, in being a Vagabond, dying wandring too and fro in the Woods and Deserts.

Some make *Memprice* to have slain his younger brother *Manlinus* (as he is sometimes called) and *Ebranc* to be the Son of *Memprice*.

Ebranc the Son of *Manlinus* succeeded his Father, and with great rejoycings was Crowned King, a prudent and valiant man, who conquered *France*, and with treasure brought thence, built the City *Eboracus* or *York*, bearing his own name: He built also the Castle called *Maiden-Castle*, now *Edenburgh*. By several Wives he had 23 Sons, all stout and war-like Lords, and his Daughters stately Ladies: He reigned 60 years.

Or part of *Germany*, as others. *Caer Ebranc*. Others write he had 20 Wives, of which he begat 20 Sons, and 30 daughters.

After the death of *Ebranc*, the Government of the Kingdom was devolved on his Son *Bentgreveſtheld*, a wise man and good Souldier, who built the Town *Carlyle*, where after he had reigned 20 years, he was buried. In his time *Solomon* governed in *Jerusalem*, to whom came the Queen of *Sheba*, *Sibilla* by name, to understand his wisdome, and those things that were spoken of him.

Alias Brut.-greveſhield, and *Brut-grenſhield*.

Ludhudebras after the decease of his Father *Bentgreveſtheld*, built the City of *Canterbury* and *Winchester*, and was buried at *Winton*.

Alias Lud, *Ludhurdebras*, *Rudibras*: He is said by others to be the Son of *Leill*.

Bladud the Son of *Ludhudebras* was next in Succession, a great Necromancer, who as 'tis said in his Acts, made the Hot Waters in *Bath* by the Art of Magick. But this is rather to be ascrib'd to Nature, since there are Baths in other places hotter than these: But I have read, that

Called sometimes *Bladud* and *Baldud*.

when

when the Prophet *Elias* desired it might rain, then three Springs of Hot Water arose in that City, useful for the Cure of Diseases of men. He had a son named *Leir*, who built *Leycester*. Thus far the Author of the Manuscript, whose rougher Latine Phrase, I have smoothed what I could, by a Paraphrastical Version.

From what hath been delivered may be collected that *Bladut* (or *Bladud* as he is commonly called) was the eighth King of the *Britains* from *Brute*, and that his line was thus. *Brute, Locrinus, Mahan, Manlinus, Ebranc, Bentgreveſheld, Lndhudebras, Bladut.* Now *Brute* being said to have come hither 1100 years before Christ, allowing to the seven preceding Kings (of which some Reigned more, some less) thirty years a piece for their Reign, one with another, it follows that *Bladud* lived near 900 years before Christ was born. He is sometimes called *Blæydin Cloyth*, that is *Blæydin* the Magician.

As to the Prophet *Elias*, the time when he desired rain, falls out to be according to computation, in the year of the world 3040. nine hundred, and some odd years before Christ; so that this Prophet and King *Bladud* were Contemporaries, and the antiquity reaches no higher on the account of the later opinion then the first.

And this is the highest pitch of Antiquity I find assigned to the Bathes; as for the Periods asserted by others, they come much short of both the former; some ascribing their inventions to *Julius Cæsar*, fifty years, or thereabouts, before Christ, which the learned Antiquarian, † Mr. *Cambden*, thinks not so probable, because *Solinus*

Gul. Malmſb.

† *Br.* p. 134.

nus, who lived in the time of *Titus Vespasian*, 130 years after, or 83 years after Christ, was the first of the *Romans* that made mention of them.

To which may be added, that perhaps *Julius Cæsar* came not so far up in the Land. For whatever some flattering Poets and Historians may faconiously deliver; certain it is that *Julius Cæsar* made not so great a Conquest here, as some do imagine. Whence *Tacitus* writes, that he discovered only, not delivered unto the *Romans*, *Britain*. His words in the Life of *Julius Agricola*, are these: *Primus omnium D. Julius cum exercitu Britanniam ingressus, quanquam prospera pugna terruerit incolas, ac littore potitus sit, potest videri ostendisse posteris, non tradidisse*, *Horace* also calls the *Briton* before *Augustus*, untouch't. And Mr. *Cambden* saith, that it is so far off from being true, which *Paterculus* reports, *bis penetrata Britannia à Cæsare*, that *Cæsar* passed twice through *Britain*, that he scarce made entry into it. For many years after this entrance of *Cæsar*, this Island was left to the free Government of their own Kings, and used their own Laws. *Epod. 7.* *Br. p. 38.*

The *Saxon* Names of *Bathanceſter*, *Hat Bathan*, and *Akmanchester*, are of later date, the *Saxons* not arriving here till the time of *Theodosius* the younger, about the year of Christ, according to the most probable Computation of Venerable *Bede*, 428. Nay, the later name of *Akmanchester* was not given till some few years after the year of Christ 577, when from a mean Condition, to which this City was then reduc'd by War, it again recovered strength and great dignity, *Cambden Br. p. 234.*

dignity, and from the great concourse of diseased people, that came for Cure, was called *Akmanchester*, that is, The City of Sickly Folks.

Neither can their Antiquity be much advanced by the ὑδατα θερμὰ, or Hot waters, in *Ptolomy*; *Aquæ Solis*, or Waters of the Sun of *Antonine*; or *Badiza* of *Stephanus*, (more recent then the former) but that which seems to come the neareſt to the forementioned Opinion of *Bladud* and *Elias*, is the Britiſh names of γ, *Ennaint*, *Caer Badon*, and above all *Caer Paladdur*, that is the City of *Pallas*, or *Minerva's* Water; eſpecially ſince *Solinus* affirms *Minerva* to have been the Patroneſs of theſe Bathes, of which no doubt, he writes in theſe words, *In* Britain *there are Hot Springs very curiouſly adorned, and kept for mens uſe, the* † *Patroneſs of which is the Goddeſs* Minerva: *There being alſo a tradition that there was formerly a Temple dedicated to* Minerva, *where now the Church of St.* Peter *and* Paul, *commonly called the Abbey Church, ſtands.*

† This is alſo mentioned by Bale, *de ſcript. Ang.* in his account of *Bladud. vid. infra* Cap. 5.

I have read alſo in an Author that wrote of theſe Bithes almoſt 100 years ago; and the firſt that wrote any thing conſiderable concerning them (Dr. *Turner*, in his Diſcourſe of the *Engliſh*, *German*, and *Italian* Bathes, making little better then a bare mention of them) That the chief Spring of *Bathe* was in the Church-yard then dedicated to *Minerva*, and after conſtituted to the Abbey of the Monks of the Order of St. *Benedict*. Erected firſt by *Blaidin Cloyeth*, or *Bladudus Magus* that wiſe Magician, a *Britain*, the ninth King after *Brute*, about the year

Iones Bathes *Aide p.* 2. *b.*

Bede. Baſil. Bale.

of

of the world, according to the Scripture account 3080 before the Incarnation of Christ † 890. *Heliſæus* Prophet then in Iſrael, † Others, 863.

But although I have ſome reaſon to diſtruſt this Genealogie of *Bladud*, which he, acccording to the Cuſtome of his Countrey, drives as high as may be, even unto *Adam*, making *Bladud* the thirtieth man, in a direct line from him; yet I cannot but in ſome meaſure, commend his Chronologie, as being not much different from the account given before. And whereas he affirms *Bladud* to have been the nineth King from *Brute*; I find, by comparing other Hiſtories, that *Leill* (if the ſame with him whom the Author of *Brutus Abreviatus* calleth *Leyr*) was not Son to *Bentgreveſheld*, but great Grand-child, being Son to *Bladud*, his, that is *Bentgreveſheld*, Grand-childs Son: and ſo *Leill*, whom he maketh Father to *Ludhudebras*, not to come in before, but after *Bladud*, as being his Son, and he the ninth King from *Brute*, and not his Father. Yet on the other hand, I muſt ſay thus much, that the name *Carlyle*, a City ſaid by the Author I follow, to be built by *Bentgreveſheld*, diſſonant from the cuſtome of thoſe times, wherein the Founders uſually called places after their own names, and many of thoſe eſpecially to which they added *Caer*, doth ſomewhat incline me think there might have been one *Leill*, Son to *Bentgreveſheld*, as ſome Hiſtorians mention, and Founder of that place aſcribed to his Father. However, the matter is not great whether *Bladud* was the eighth King from *Brute*, as my Author ſuppoſes, or the ninth, or tenth, as others; I inferring

By *Baſe* he is ſaid to be the tenth King of the *Britains*.

inferring no more from the preceding History then this, That *Bladud* lived near 900 years before Christ; since of the exact time of his flourishing, more then by Conjecture, by reason of the Confusion and Disagreement among Historians touching the Number, and Succession of the Kings, and time of their Reign, we have no certain account.

But to be as particular as I may, because some years passed between the Birth of those seven Kings mentioned before, and the begining of their Reigns, and also because *Gwenthlea*, or *Gwendoloena*, and *Leill*, are said by other Historians to have Reigned 40 years (*viz.* the former 15, the later 25) which are not there accounted for, the surer way will be to take our account from the Year of the World. Now *Brute* being reported to have entred *Albion A. M.* 2855, and *Bladud* to have begun his Reign *A.M.* 3100, the difference between these two numbers is 245 which being taken out of 1108 (the year before Christ, in which *Brute* came hither, answering to the Year of the World 2855) the Remainder will be 863 (the Year before Christ, answering to the Year of the World 3100) so that according to this Computation, *Bladud* began his Reign over the *Britains*, just 863 years before Christ was born, and Reigning 20 years, died in the Year *Ante Christum*, 843. I know *Fabian* the Author of *Polychronicon*, and others, differ somewhat in their Chronologie concerning *Bladud* from that I have given, but I look on this to be as probable as any.

Alexander Necham, a Poet of our own, some-

what

what above 400 years ago (with whom, as to the Antiquity of the Bathes, Dr. *Jorden* contents himself) wrote these Verses on the Bathes. *Cap.* 17.

Bathonia Thermis vix profero Virgilianas,
Confecto prosunt Balnea nostra seni,
Prosunt Attritis, Collisis, Invalidisque,
Et quorum morbis frigida causa subest.
Prævenit humanum stabilis natura laborem,
Servit naturæ legibus artis opus.
Igne suo succensa quibus data Balnea fervent
Ænea subter aquas vasa latere putant.
Errorem figmenta solent inducere passim.
Sed quid? Sulphureum novimus esse locum.

Which I thus made English;

BAthes Bains with *Virgils* I compare,
Usefull for antient folk they are;
Bruis'd, weak, consum'd, as well as old.
And in al griefs whose source is cold.
Nature mans labour doth prevent
And art again serves her intent.
There's fire under-ground, some say,
That thus makes Bathes great pots to play.
Fancy doth often Error breed.
But what? from Brimstone these proceed.

CHAP.

CHAP. II.

Of the Antiquity of the City of *Bath*, and things relating thereunto.

Bathe *called first* Caer Blæidin, *afterwards* Caer Bathe. *When inhabited.* Coill *and* Edgar *(whose Statues stand at the end of the Council-house) who, and when they flourished.* Bathe *besieged by the* Saxons; *relieved by King* Arthur. Offa's *Church. Difference between the Mayor and Covent. Hospitals. Free-School. The Author of the History of the* Worthies *of* England *censured, and some of his mistakes discovered.*

IT is not I think, to be doubted, but that the Bathes were before the City, and gave Name to it: Sick people, in all probability that came hither for relief, first making small Cottages for their Conveniences, which were afterwards improved into fairer Buildings. So that now in this particular, there are few places in *England* that exceed it.

That this place was built, or rather begun, by King *Bladud*, is the opinion of some, and that he called it by his own Name *Caer Blæidin*, which sometime after came to be *Caer Bathe*. That it was inhabited in the time of the *Britains*, at least 50 years before Christ, appears from the names they gave it of *Caer Badon*, and *Caer Palladur* (of which before) unless it be said that these Names might be given by some *Britains*, in the

Mat. westm.

Romans,

Romans or Saxons time, which seems not to carry any great probability. Nay, I find it recorded, that in the year *ante Christum* 684. *Sisillus*, or, after some Writers, *Sylvius* Brother of *Gurguſtus*, was made Ruler over *Britain*, and reigning 49 years, was buried at *Caer Badon*, or *Bath*. However, many Roman Monuments there are, Inſcriptions and Images in the City walls, and elſewhere, (of which Chap. 4. gives a particular Account) which evidently prove its being frequented before the 412 year of Chriſts Incarnation, about which time (or as others account, 430) the Roman Jurisdiction ceaſed in this Iſland. Engl. Chron. Lanquet.

The Statues alſo of *Coill* a Britiſh King, and *Edgar* a Saxon (who are ſaid to have given Charters to this City) placed at the end of the Town-Hall, or Council-Houſe, are Arguments of its Antiquity.

Coill (that I may ſpeak ſomewhat briefly of him) was an Earl in the time of *Aſclepiades* (whom the *Britains* after the death of *Lucius*, being wearied out with a bloody inteſtine War, which laſted more than 50 years, were at laſt conſtrained to elect their King) about the year of Our Lord 250. Afterwards aſpiring to be greater, and building a Town which from himſelf he called *Colcheſter*; *Aſclepiades* began to fear him, and raiſing an Army, met him in the field, in which Battle, *Aſclepiades* was ſlain, and ſhortly after *Coill* choſen King, who governed the Britains with a great deal of honour; and having married his Daughter *Helena* to *Conſtantius*, ſent from *Rome* into *Britain* to demand Tribute, not *Ant. Br. Ab. Ms.* *Alias Aſalapiodatus.* Others 256. *Britannice Caercolyn.*

not long after dyed, and was buried at *Colchester*: yet some there are who ascribe the building of this Town to *Coilus*, Son of *Marucis*, and Father of *Lucius*, King of the Britains, *A. D.* 126.

Edgar, one of the later Kings of the Saxons, bestowed on this City (as Mr. *Cambden* reports) very many Immunities, the memory of which thing, even in his time, the Citizens yearly with solemn playes, did celebrate. He was a stout man, and is said to have had none like him on this side *Arthur*, bearing this stile about the year 970. *The Monarch of all Albion*; Or, as it is elsewhere more largely expres's'd, *King of English-men, and of all the Kings of the Islands of the British Ocean, and all the Nations contained in* Britain, *Emperour and Lord*. A Souldier he was in the Camp of *Cupid* as well as *Mars*, and is noted for this, That having a mind to *Estrilda* the Wife of *Athelwold*, he placed him (as *David* did *Uriah*) in the front of a Battel against the Danes, in the defence of *York*; where *Athelwold* being slain, *Edgar* married his Widdow, but was so severely check'd by Saint *Dunstane*, that he ever after lived a religious life; and having reigned 17 years, bid adieu to the World, and was buried at *Glastonbury*. *Edgar* began his reign about the year of Christ 959. but was not Crowned till 12 years after, *A. D.* 971. which was done, according to some writers, at *Bath*, to others at *Kingston* by *Dunstan* Arch-Bishop of *Canterbury* (who, some say, was banished at that time) and *Oswald* Arch-Bishop of *York*: his Coronation was deferred, because of his impetuous inclinations to the female Sex, and

Br. p. 234.

Anglorum Basileus omniumq; Regum Insularum oceani quæ Britanniam circumjacent, cunctarumq; Nationum, quæ infra eam includuntur Imperator & Dominus. Henr. Spelm. *Conc. Tom.* 1. *p.* 432. & Seldenus *in Mar. Claus.*

Militat omnis amans, & habet sua castra Cupido. Ovid.

An. 973. Mat. Westm.

and especially to one *Wilfride*, who to avoid the Kings Caresses, took on her the habit of a Nun, but in vain; for he had his pleasure, and got on her a daughter named *Edith*; for which offence he was enjoyned seven years penance, and lived not long after his Coronation.

About the year 472, or 44 years after their arrival here out of *Germany*, the English Saxons besieged this City, with whom King *Arthur* fought a great Battel on *Mons Badonicus*, now called *Bannesdowne*, and slew so many of them, that they had little heart to make any further attempt for a considerable time, but left it to the quiet possession of the Britains. *Ninnius* writeth, that the 12 of King *Arthur*'s Battels against the Saxons, was at the Hill or Town of *Bath*, where many a one was slain by his force and might. *Bath* was also in the time of King *Arthur*, by whom it was relieved, besieged by *Cheldericus* King of *Almain*. The story as mine Author relates it, was thus; *Eodem tempore venit Cheldericus*, &c. At the same time (speaking of the reign of King *Arthur*) came *Cheldericus* a valiant King out of *Almaine*, and landed in *Scotland* with 500 Ships: *Arthur* hearing of this at the siege of *Colegrin* near *York*, left the siege, and coming to *London*, sent letters into *Britain* the less, to King *Hoel* his Sisters Son; who in a short time came into *England* with a great Army, and was met by *Arthur* at *Winchester*, with great rejoycings. These two going both to *Nottingham* (which *Cheldericus* had besieged, but not taken) *Arthur* came upon him unawares, and made a great slaughter among his men; *Cheldericus*

Cambden ubi supra.

Yet N.

Aus. Br. Abb. Ms.

rlcus himself fled into a wood, where *Arthur* finding him, he swore, that if he and his Souldiers were permitted to depart, he would never more for the future trouble his Kingdom: *Arthur* condescended hereto, but the wind proving crosse when they were on the Sea, they came back again, and landing at *Totnes*, did a great deal of mischief, destroying the Countrey as far as *Bath*. They of *Bath* shutting their Gates, made a stout resistance: but when this was known to *Arthur* then in the *Marches* of *Scotland*, he came to the relief of *Bath*, fought with *Cheldericus*, and discomfited his Army, &c. yet in the year 577. on a strong siege, and strong battery by the Saxons, it yielded, but afterwards grew into great repute, and got a new name, viz. *Akmancheſter*.

Not long after the year 552. *Ceaulmus* King of the West Saxons fought with the Britains, and took from them the Cities of *Bath*, *Glouceſter* and *Worceſter*.

Cambden. Br. p. 234. *A. D.* 676. *Oſorich* founded here a Nunnery, and not long after, *Offa* King of *Mercia* built a Church, both which in the time of the Danish Wars were demolish'd; out of the ruines of those two arose the Church of Saint *Peter*, in which *Edgar* was Crowned (as is mentioned before) but of the Church, more in its place. This *Offa* was Brother to *Oſwald*, surnamed *Chriſtianiſſimus*, and is said to have spent much of his time at *Bath*. *Offa* (saith the Author of *Brutus abbreviatus*) *frater Oſwaldi*; *Iſte Offa, multum morabatur Bathoniæ.*

Concerning his supposed Tomb, and place of burial, see Chap. 4. Domesday-Book.

In the time of *Edward* the Confessor, *Bath* flourished exceedingly, the King having there

64 Bur-

64 Burgers, and 30 Burgers of others; the City paying tribute according to 20 Hides, which amounts to about 80 yard land.

In the reign of *William Rufus*, *Robert Mowbray*, Nephew to the Bishop of *Coustance*, sack'd and burnt it. *Cambden. Br.* p. 234.

The Industrious Mr. *Prynne* (to whom I am obliged for some marginal Remarks) in his *Brevia Parliamentaria Rediviva*, and fourth part of a brief Register of Parliamentary Writs, hath given an account of Citizens returned to serve in Parliament for this City, ever since the 26 *th.* year of King *Ed.* 1. about *A. D.* 1298. p: 298. p. 299.

It is also recorded, that in the year 1418. in the time of *H.* 5. there arose a contest between the religious persons, *John Tylyford* Prior, with his Covent, and the Mayor about ringing of the Bells, which lasted some years, but was afterwards composed, and brought to a good issue. *Libell. Rub. de* Bath. *Ms.*

In *Bath* are three Hospitals (it self, indeed, being but one great one) St. *Johns*, *Bellots*, and the *Bimburies*, sometimes called St. *Katherines*; besides a Free-school erected, (as by the Inscription over the door it appears) in the time of King *Ed.* 6.

The Hospital of St. *Johns* was founded *A. D.* 1174. by *Reginald fitz Joceline*, a Lumbard, Bishop of *Bath* and *Wells*, and afterwards translated to *Canterbury*, but before he was possessed of his new honour died, and was buried at *Bath*. It was valued at the yearly Rent of 22 *l.* 19 *s.* 6 *d.* since which time its Revenues are much encreased; he gave it this name, as I suppose, from St. *Johns* in the *Savoy*, where he was consecrated *Godw. Cat.* p. 364.

Biſhop after his return from beyond Sea, by *Richard* Arch-Biſhop of *Canterbury*.

Where, by the way, I cannot but take notice that this Hoſpital is ſaid to be built by *Joceline* of *Wells*, and *Hugo* Biſhop of *Lincolne* in the late Account of the Worthies of *England*. In which *Hiſtory* (beſides the Confuſion of *Joceline de Wells*, with *Reginald fitz Joceline*) *the Author* is guilty (that I may ſay no worſe) of many miſtakes: To give an inſtance or two inſtead of a larger Catalogue that might be produc'd; he affirms, that *Joceline* of *Wells* was the firſt man that fixed on the title of Biſhop of *Bath* and *Wells*, and tranſmitted it to all his Succeſſors, when 'tis manifeſt out of *Biſhop Godwins Catalogue* of Biſhops, that *Robert* Biſhop of *Wells* was the man, the 18*th*. Biſhop of that *See*, and not *Joceline* who was the 21.

p. 363.

He writes alſo, (which is a thing I confeſs of no great moment, but yet a miſtake) that the famous Dr. *Harvey* was never married, when his Wife is mentioned by himſelf. And to inſtance in no more now (becauſe I would not digreſs too far) he avers the ſame perſon, though living a Batchellor, to have left behind him three Children, which he calls his three Books, *viz. De Sanguinis Circuitu, De Generatione, & De Ovo*; whereas the Doctor that ever I could find (who poſſibly have made as diligent a ſearch after the writings of that modeſt, ingenious, and (however the ignorance and envy of ſome have endeavoured to traduce him) learned Phyſitian, (whoſe memory I deſervedly reſpect and honour) as any other can, I ſay Dr. *Harvey* (that ever

De Gen. An. Exer. 5. p.m. 69.

ever I could understand) never printed any thing besides his Treatise of the Circulation of the Blood, and his Exercitations concerning the Generation of Animals, the *Historian* making two Books of *De Generatione, & de Ovo*, when indeed they are but one.

I acknowledge he mentions many things intended for the publick; as 1. Exercitations about Respiration of Animals. 2. A Treatise of the Love, lust, and gendring of living Creatures. 3. Of Nutrition. 4. Medicinal Observations. 5. Physiologia, with some others, wherein no doubt that excellent Person had made many rare and considerable discoveries, which we are so happy now to enjoy; but that any thing else, save the two forementioned Treatises, was permitted, or any other Book *De Ovo*, composed by Dr. *Harvey*, besides that *De Generatione Animalium* (wherein he ingeniously observes the *Primordium*, or first beginning of all living Creatures to be either an egg, or something Analogical to it.) I should be very glad to be informed.

Bellots Hospital was built by *Thomas Bellot* Esquire, one of the Executors of the Lord *Cecill*, in the time of King *James*, of whom we shall speak more largely in the next Chapter of the Church, to which he was a great Benefactor.

As for the Bimburies, I can learn no more concerning it, than this, that it was built by seven Sisters, who left this Hospital behind them, as a Monument to Posterity, both of their Charity and Name.

CHAP. III.

Of the Church of Saint *Peter* and *Paul*.

An account of the Church of St. Peter *and* Paul, *in* Bathe, *from the first foundation to the time it was finished. A Latin Poem on the same Subject, written to Bishop* Mountague, *with the Answer of the Bishop.*

THE Church of St. *Peter* and *Paul*, commonly called the Abbey Church, as now it is, is a neat, and curious Fabrick; of which, that I may give some account, from its Original, many Periods, and great alterations it hath undergone, as far forth as my Observation, Information, and what Records I have seen will reach: The first Church I find mentioned since the Temple of *Minerva*, (which some place here) was that built by *Offa* King of *Mercia*, and brother to *Oswald* (of which before) in the year after Christ 775. which was afterwards destroyed by the *Danes*, and in the year 1010, re-edified by *Elphegus*, who being a man of great Parentage, and Prior of *Glastonbury*, left that place, and betook himself to *Bathe*, where living a very strict and exemplary life, even to admiration, he was chosen Abbot, and in the year 984 Bishop of *Wincheſter*, and *A.* 1006 promoted to the Arch-Bishoprick of *Canterbury*, in which time he new built this Church, four years after his coming to that See. But the Fabrick he erected stood not long; for 77 years after, or *A. D.* 1087. both it,

775
1010

it, and almost the whole City, was consumed by fire, by *Robert Mowbray*, Nephew to the Bishop of *Constance*, in the first year of *William Rufus*.

The next year following, viz. *A.D.* 1088. 1088
appeared *John de Villula*, a *French-man*, born at *Tours*, and sometime Practitioner in Physick, or to speak more plain, an Empirick (such as now almost every place doth abound withall, we having just cause to renew the Complaint made by *Hypocrates* in his time, that there are now adays, *L. de leg.*
Ἰητροὶ φήμη μὲν πολλοὶ, ἔργω δὲ παγχυ βαιοί.
Many, by a sort of people, their own Creatures, much admir'd, but what Artists they are is easily to be said) for the Historian brands him with *Gul. Malasb.*
this Character, that he was *usu, non literis, medicus probatus*, a man practised more by rote, then any great cunning, and if he chanced at any time to do any good, it was more to be attributed to the strength of Nature, and his good hap, then to any Art in the man, or accountable Virtues in his Medicines. This man however, although not for his reach in Physick, was to be commended in this that he had a good liking to the Abbey, and though a poor Physitian, was a rich man, and a great Benefactor to the Church, which he building from the ground, and augmenting the Revenues from a small mater to a considerable proportion, may seem to deserve the name of the first Author, and Founder of it. He lived not to see it finish'd, being prevented by death, which happened the 29th. of *December*, 1122, and was buried at *Bathe*, in the Church he built.

This *John* was Bishop of *Wells*, but upon some dislike † removed his Episcopal Chair to *Bathe*, and was known by the title of Bishop of *Bathe*, renouncing that of *Wells*, and bought this City of *William Rufus*, (or, as some say, *H.* 2.) for 500 Marks, which continued in the Bishops hands till the 4th. year of *Rich.* 1. about *A. D.* 1192. at which time *Saverick*, first Arch-Deacon of *Northampton*, afterwards Bishop of *Bathe* and *Wells*, a *German*, and Kinsman to the Emperour, in order to the more speedy effecting his design of being Bishop, to the performance of which, among other things, as Conditions of the Kings Release, (being taken Prisoner by *Leopold* Arch-Duke of *Austria*) the Emperour had engaged him) returned the Possession of the City to King *Richard* the first.

† The Charters of *William Rufus* and *H.* 1. for translating his See to *Bathe*, and the manner thereof, may be seen in Mr. *Dugdales Monast. Angl.* pp. 185, 186.

1137 In the year 1137 *July* 29, 15 years after the death of *John de Villula*, the Church he lately built was consumed by fire, and re-edified by *Robert*, a Monk of *Lewes*, born in *Normandy*, but by Parentage a *Flemming*, then Bishop of that See. He not only made good what the fire had destroyed, but carried on the work to a greater perfection. In the troubles between *Maud* the Empress, and King *Stephen*, he suffered a long and a close restraint at *Bathe*, from the King, and after his enlargement, endeavoured an Accommodation between the two Churches of *Bath* and *Wells*, which had differed many years about the Episcopal See, and at last, with consent of both parties, made this agreement, that the Bishops hereafter should be called Bishops of *Bathe* and *Wells*; That each of them should by Commission

miſſion appoint Electors, the See being void, by whoſe voices the Biſhop ſhould be choſen; And that he ſhould be inſtalled with both of theſe Churches. The ſecond of which Articles was not long obſerved, for *A. D.* 1244. in the 29th year of *Hen.* 3. The Monks of *Bathe*, refuſing to joyn with the Chapter of *Wells*, choſe of themſelves one † *Roger* for Biſhop, which occaſioned a long Suit in Law between the two Churches, compoſed afterwards by the Biſhop, who died not long after, and was buried at *Bathe*. The Condition of which Compoſition was this; That they of *Wells* muſt be ſatisfied for the preſent, and they of *Bathe* promiſe performance of the Agreement made by *Robert*, for the future, which was done accordingly.

† He was confirmed Biſhop by King *Hen.* 3. his Patent, *ad inſtantiam Domini Papæ, de gratia Regis Speciali, ſalvo jure Regis, & Eccleſiæ Wellenſis. P.* 28. *H.* 3. *m.* 6. *intus.*

This Structure erected by *Robert*, continued till the time of *Henry* the 7th; when *Oliver King*, the 23d Biſhop after the Union of *Bathe* and *Wells*, pulling down the old Church built by *Robert*, not *John de Villula* (which was burnt, as Mr. *Cambden* affirms) began the foundation of a fair and ſumptuous Building, but left it, by reaſon of his death, whatever the lately mentioned Hiſtorian relates, very imperfect. For beſides the Coſt beſtowed on it by Cardinal *Hadrian de Caſtallo*, choſen Biſhop *A. D.* 1505. which I think, was not great; *William Bird*, the laſt Prior of the Abbey, undertook it, and partly of himſelf, and partly by the help of others, almoſt brought it to perfection, when in a ſhort time after the diſſolution of Religious Houſes enſuing in the time of *Henry* the eighth, it was again demoliſh'd. In memory of this Prior *Bird*,

Br. p. 234.

Bird, there is in the Chappel, on the South side of the Quire, at the East end, a Coat of Armes in Stone, a Cheveron between three Falcons, their Wings and Members displai'd; on a Chief, a Rose between two pretious Stones, and for a Creſt a Miter and Crozier. And in the out-side of the Chappel Wall, Southward, a W. and a Bird.

Neither are there wanting memorials of the Name of the foreſaid *Oliver*. For in the Front of the Church, on both sides, on a Pillar, are placed two Elephants about an Olive Tree, and an Inſcription engraven in Stone under it, in alluſion to the parable of *Fotham*, of which this is part,

Judges 9.

Trees going to chuſe their King
Said, be to us the Oliver *King*

(Which in the late times cauſed ſome to ſuſpect it for a Propheſie) with a Miter over all. This *Oliver King* was Doctor of Laws, of Kings Colledge in *Cambridge*, Principal Secretary to three Monarchs of this Land, *Edward* the 4th, *Edward* the 5th, and *Henry* the 7th. Regiſter of the Knights of the Garter, Biſhop of *Exeter*, and thence tranſlated hither, *Novemb.* 6. 1495. died *Jan.* 24. 1503. and is thought to lie buried at *Windſor*, where he was ſometime Canon.

D.F.

The Death of Biſhop *King* obſtructed this Structure (as a Reverend Doctor is pleaſed to quibble) ſo that it ſtood a long time neglected, which gave occaſion to one to write on the Church Wall with a Char-coal.

O Church I wail thy woful plight
Whom King, nor Card'nal, Clark, nor Knight
Have yet reſtor'd to antient right.

Alluding herein to Biſhop King, who began it, and his four Succeſſors in 35 years, *viz.* Cardinal *Hadrian* mentioned before, who ſat Biſhop 12 years, and was afterwards deprived of this, and all other promotions, for conſpiring with ſome other Cardinals, the Death of Pope *Leo* the 10th. Cardinal *Wolſey*, who held the Biſhoprick *in Commendam* four years, and was then tranſlated to *Durham*. Biſhop *Clark*, who ſate 19 years, and died in the end of the year 1540, being poyſoned, as was ſuppoſed, in *Germany*, when he went Ambaſſadour to the Duke of *Cleve*, to give a reaſon of the Kings Divorce from the Lady *Anne of Cleve*, his Siſter; and Biſhop *Knight*. Theſe four contributing nothing conſiderable to the finiſhing thereof. Alſo one *Caſſadore*, a popiſhly affected perſon, wrote a Prophefie of this Church, to be ſeen in *Fullers* Worthies, with what he thinks is the meaning of it. Somerſ. p. 39.

Upon the diſſolution of the Abbey, the Church was uncovered, the Lead taken away, and the Walls much ruin'd, and ſo continued for ſome time. But ſince its laſt demolition, in the Reign of King *Henry* the 8th, it hath thrice been attempted to be re-edified; Firſt in the time of Queen *Elizabeth*, by a General Collection, by which the Work was not much advanc'd. The Second, in the beginning of the Reign of King *James*, *A. D.*

A. D. 1604. in whose time it met with many Benefactors; the principal whereof to this second work was *Thomas Bellot* Esquire, Steward of the House, and one of the Executors of the Right Honourable, *William* Lord *Barkley*, sometime Lord Treasurer of *England*, who made some entrance on this work in the Reign of Queen *Elizabeth*, and last of all, about the middle of King *James's* Reign it was finish'd and brought to perfection, as by the Munificence of Noble men, Knights, Gentlemen, and others, whose Names are on Record, so especially by the liberal hand of Dr. *James Mounntague*, sometime Bishop of this Diocese, who at one time gave 1000 pounds toward its Reparation, and lies buried in the body of the Church, deceased *July* 20. 1618.

It appears also from the Memorials of the Church, that before the first of these three last attempts to repair it, there was little of the Church standing, save the bare Walls, and those too, in many places, much impaired, which being then, as it was, decayed in the hands of *Edmund Colethurst* Esquire, was by him bestowed on the City, though uncovered, and much ruin'd, as it had long stood after the dissolution; and therefore he bears the name of the principal Benefactor to the first work.

The particulars of the Reparations, with the Names, and Sums of the Benefactors from the time of Queen *Elizabeth* downwards (which are not for me here distinctly to mention) are Recorded in a Book kept for that purpose in the Library belonging to the Church, begun by Bishop Lake, and augmented by some others, but yet

yet ſtands in need of the helping hands of more Benefactors.

And although I have ſaid ſo much concerning this Church already, yet I ſhall crave leave to add as a Concluſion to this Matter a Poem, which accidentally came to my hands by the means of Mr. *John Parker*, Citizen of *Bathe*, a lover of Antiquity, and my good Friend (to whom I acknowledge my ſelf engag'd for the aſſiſtance he afforded me in my ſearch after the Antiquities of the the City) found in the Study among other Papers, of that learned Knight, Sir *John Harrington*, whether made by himſelf, as ſome imagine (who well might do it, having a great genius to Poetry, and called by Dr. *Fuller*, one of the moſt ingenious Poets of our Nation) or ſome other, I know not; written, and as it ſeems, ſpoken to Biſhop *Mountague*, at his firſt coming to *Bathe*, and Sight of the Church; which I ſhould have tranſlated, but that the Subſtance of it, as much as is neceſſary to be known for Hiſtory, is contained in the foregoing account. However, to preſerve it from periſhing, and to gratifie the lover of Antiquity, (to whom I chuſe rather to incur the cenſure of being Prodigal, then any way Nice, in with-holding any thing I think may deſerve their acceptance) I ſhall inſert it here, in Latin, as I found it. The Title thus,

Conditionis

Conditionis Variæ

ECCLESIÆ SANCTI PETRI & PAULI Bathonienſis,

A PRIMIS

FUNDAMENTIS,

Actis an. 775.

AD ANNUM DECURRENTEM, 1609.

Hiſtorico-Poetica Ἐξήγησις;

Deq;

Fæliciſſima ejuſdem Eccleſiæ reſtauratione

VATICINIUM.

Ad Reverendiſſimum in Chriſto Patrem, Jacob. *providentia divina, digniſſimum Eccleſiæ* Bathonienſis *&* Wellenſis *Epiſcopum,* Bathoniam *primo fæliciter inviſentem, & viſitantem.*

MActe, bonis avibus; recidivi limino Templi
(In Chriſto reverende Pater) gratiſſimus intras. Macte,

Macte, sed haud pigeat prius æqua mente parumper
Pristina delubri perpendere fata miselli.
Temporis elapsi studio monumenta revolvens — Historia.
Attento, invenies hujus fundamina Templi,
Prima *Offam*, priscum regem, jeciſſe; secunda — 775.
Ephegum, regni primatem; Tertia tandem — 1010.
(Cum duo Danorum rabies, igniſq; priora
Vastasset) sumptu posuit majore *Johannes* — 1088.
De Villa, natu Gallus, non infimus artis — Agyrta.
Professor medicæ, *Wellenſi* ingratior ædi;
Qui, postquam variis viguisset Episcopus annis,
Sedem Thermopolin Cathedralem transtulit illinc,
Urbe hac, quingentis Marcis, a Rege coempta,
Pulchrius antiquis fanum construxit: at ipsum
Ævo combussit pariter Jovis ira sequenti.
Structorem celebris misit Normannia Quartum,
Officio Monachum, *Robertum* nomine, molem — 1137.
Subversum toties qui restauravit; & inter
Presbyteros, litem, de Sedis honore, diremit,
Exornans titulis utramq; æqualibus orbem.
Tandem post seriem numerosam, munificamq;,
Insignis præsul pietate, vicesimus atq;
Tertius, hunc sequitur; qui fastum nominis omen,
Expressit factis, *Oliver King* dictus, *Olivam* — 1495.
Et *Regem* vere referebat, ad instar olivam
Pacis erat populo, simul ubertatis & author.
At magis hoc retulit regalis munere Regem,
Quippe opus incultum *Rodberti* sustulit, atq;
Illius, extemplo vice, fundamenta locavit,
Ista; dedit solidis speciosa pleromata muris.

Tecta

Tecta superstruxit sublimibus alta Columnis,
Areolas soleis tongas substravit & amplas,
Omnia ad hanc pulchram structuras cætera formam,
Et fundis, dubio procul, instructurus opimus,
Morte immortales subito est arreptus ad arces.
Tantæ molis erat tam clarum condere Templum!
Ne tamen his tantis perfectio debita cæptis
Deforet, huic operi Colophonem attexuit, almus
Abbatiæ Rector *Gulielmus Birdus*, At eheu!
Sanctis stare diu fatis (proh fata!) negatum est.
Horrida de innocuis fertur sententia famis;
Abbatiæ pereunt, spoliantur Templa, rapinis
Tecta patent, reditus, fundi, Sacraria; quid non?
(Unde nefas tantum Zeli fautoribus?) una
Iste, vel in Cunis, insons discerpitur infans.
Impete diripitur violento hæc fabrica; præstant
Saxa, vitrum, plumbum, Campanæ, ac omnia præter
Hoc miserum χαλκὸν Tantæ at quæ Causa ruinæ?
Num pietatis amor an amor sceleratus habendi?
Hic amor exitio est Templis, Templiq; ministris,
Hic amor extinxit clarissima lumina regni.
Nec finit hic Amor hæc extincta resumere lucem,
Nemo bonum Templi, Templi bona quisq; requirit.
Hinc hæc Cimmeriis, per tot, tam turpiter, anBOS,

Maxima

Maxima lux urbis, latuit suppressa tenebris,
Sed pater omnibonus, cui provida cura Suarum
est,
Hanc piceam nuper, cælesti campade, noctem
Dispulit e multis Sanctorum cordibus, unde
Accendere suo nostrum de lumine lumen.
Sic tamen, ut quivis magis hinc sibi luceat ipsi,
Ut tanto ad præsens reliquos veneremur honore,
Vivida quos totum celebravit fama per orbem,
Nobile *Bellotti* sidus, sic emicat, omnes
Inter nutritios Templorum jure colendos,
Plena velut stellis præfulget Luna minutis.
Singula quæ cernis pulchræ ornamenta Capellæ,
Area, porta, solum, Subsellia, Rostra, fenestræ,
Bellottum unanimi Compellant ore parentem.
Bellottum sonitu reboat Campana canoro,
Μωχοτροφίᾶ sonant Bellottum, Balnea, vici,
Compita, *Bellotti* jactant ad sidera nomen,
Quod Christi est cultor simul excultorq; sacrorum.

VATICINIUM.

DEsine plura: sat est veterum, peragenda peractis
Succedant; meliora bonis, majora minutis.
Auspiciis huc misse sacris (Sanctissime Præsul!)
Sensibus hæc imis superum Consulta repone,
Quæ tibi fatidico dispandit carmine Vates,
Læta ruinoso proclamans omnia Templo.
Quo decet, hanc specta, vultu, sine nube, sereno,
Fœcundam laudum segetem sine fine Tuarum.

Molliter ossa Cubant *Offæ*, ac *Elphegi*, *Oliveri*
Rodberti, *ac Birdi*, merito celebrentur honore;
Debita Bellotto reddatur palma benigno.
Per-pius extento Bellottus floreat ævo.
Non equidem invideo, lætor mage, gratulor illi.
Quod si tam celebrem mereatur guttula laudem,
Præmia quæ referet largos qui funditat imbres?
Tantum at honorifico cedes, Bellotte, *Jacobo*,
Effuso tenuis quantum imbris guttula cecit.
Bellotti guttis rorata Capella vireſcit,
Imbribus aſſiduis Divi madefacta *Jacobi*
Integra quam lætos diffundent Templa racemos.
Nec tamen hæc aqueo vitis cupit imbre rigari:
Aureolo hanc Danaem ſaturabis, Jupiter, imbre,
Hinc quæ ſpreta diu languenti Eccleſia morbo
Intabuit; vitam, Te Te medicante reſumit,
Ut redit infuſo flacceſcens vena Lyæo,
Hujus ſint alii fautores, ſydera, fani;
Cynthia Bellottus; ſolus Tu θοῖϛος Apollo.
Hæc Tu vivifico reparabis membra Calore;
Hæc Tu magnifico decorabis Tecta nitore.
Aſpice ſurgenti lætentur ut omnia Templo.
Grandævum videor mihi proſpectare *Jacobum*,
Aſpectus virtute Tui, torpore ſolutum,
Atq; reornato ſcandentem climate Cælos.
Ut renovat vires, ut concipit æthera mente;
Inſuper alatos, ultroq; citroq; meantes
Cœlicolas video, bona climacteribus illis
Nuncia portantes ſuperis: ac gaudia divum
Inde renarrantes terris de Præſule tanto;
Teq; cohortantes (propria ſat ſponte citatum)
Euge! opus hoc miræ pietatis perfice Præſul.
Te nempe ad decus hoc peperit natura, replevit
Dotibus eximiis Deus, ars perfecta polivit,

In

In gremio reforet ter magni gratia Regis:
Ditavitque bonis tanta ad molimina natis.
Huc opulenta Tibi ſua fundit viſcera tellus,
Huc Tua Te virtus, ſorte ancillante, propellit.
Euge! opus hoc mira pietatis perfice Præſul!
Aggredere æternos, ſervit Tibi tempus, honores
His petitur Cælum Scalis, hac itur ad aſtra.
Nec mora, fervet opus, ſtructor, lapicida, peritus
Gypſator, ſculptor, fuſtor, vitrarius: omnes
Artifices inſtant ardentes. Mœnia ſurgunt,
Diſſita quæ fuerant loca concamerantur Eriſmis,
Extima plumboſo velantur tegmine, pulchris
Intima Cælantur laquearibus: omnia miris
Sunt decorata modis: reſpondent omnia vatis.
Nec deerunt myſtæ, Celebrent qui ſacra, frequentes.
Sed numeroſa brevi totam quæ Compleat ædem.
Pompa Sacerdotum, Pſalmodorumq; Decano
Producente Chorum, Cantabit grata Jehovæ
Cantia, tantorum fonti, authoriq; bonorum.
Hæc mihi præſagit meus non ignara futuri.
Corpore (quis neget hoc?) ſpecioſo hæc templa Jacobus
Donavit præſul (pia nam decreta bonorum
Æquivalent factis) animam Rex ipſe Jacobus
(Hoc quoq; quis dubitat?) tribuet. Deus alme Jacobi,
Decretis benedic factiſq; utriuſq; Jacobi:
O fortunatam nimium, bona ſi tua noris,
Thermopolin, tali fruenis quæ præſule, Rege!
Funde Deo ſummas ex imo pectore grates,
Et cola, perpetuo pietatis honore, Jacobos.
Quo pede Cæpiſti, Præſul digniſſime, pergas.

Episcopi Responsio.

Cupivi diu has ruinas, & hæc rudera videre, & contemplari, has vero ruinas, & hæc rudera videre, & contemplari jam dolet. Ingrediar tamen, sed hoc animo, ut nunquam hoc more sim reingressurus, priusquam isthæc melius tecta videro.

The Bishops Answer.

I Have long desired to see and contemplate these ruines and rubbish, and now it grieves me to behold them. However, I will enter, but with this intent, never to re-enter, till I see them better cover'd.

CHAP. IV.

Of the *Roman* Antiquities of *Bathe*.

Roman *Antiquities of* Bathe *divided into three Sorts. An Enumeration and Explication of them Many read, and understood otherwise, then by Mr.* Cambden. *Some Additions.* Roman *Coins.*

THE *Roman* Antiquities, Inscriptions and Images, in the Walls and elsewhere of this City, were taken notice of by Mr. *Cambden* at his being here, and inserted into his *Britannia*; yet because some alterations have hapened to some

some of them since his time, and others seem to me to be read and understood otherwise, then he hath there represented them (not to mention what I have added, not to be found in him) I shall give a brief account, and what Explication I can, of them all, in order as they stand.

I shall distribute them into three Sorts. Those that are between the South and West Gates; Those that are between the West and North Gates; And those in the Garden, formerly *Robert Chambers's*, now belonging to *William Burvard*.

The first, of the first sort we meet withall, (not taken notice of by Mr. *Cambden*) is the draught of a great Face, (which yet I cannot affirm to be truly *Roman*) about a foot in bredth, and near as much in length, much resembling the Moon, as it is usually drawn. Whether this was a memorial of the Idoll of some Pagan (which is not very likely) or rather set up in memory of some Gyagntick person, whose parts were proportionable to this Face (which is more probable) I know not. Sure I am that *England* hath had those Sons of *Anack*, as well as other Countries, as, besides Histories, the prodigious Bones digged up in several places thereof, do witness; and particularly (seeing we are apt to suspect things done many years ago, relations of this nature being not like Pictures, *Quibus è longinquo reverentia major*) the entire Bones of a man of unusual dimensions, found not 20 years since, in *Glocester-shire*, in a Field, between *Over*, and *Thornbury*, do sufficiently evince.

This Sceleton (as I heard it related by a credible

dible Author, who had it from an eye-witness) was inclosed within the body of a massie Stone, so artificially cemented together, that the joynts were indiscoverable. In the middle thereof (as it were in a Vault) sate the Bones of two persons, one very great, and the other less. The Scull of the greater was half an Inch thick, and the Ulna, as big as the Gentlemans Wrist, who saw it (who yet is a corpulent man, and hath none of the least) and as long as from his shoulder to his fingers ends. There were Inscriptions also, and some Coins, both Silver and Brass, about, and in it, but what they were, I cannot yet learn, having not hitherto had the opportunity to see either the one, or the other.

Since the Relation of the former person, having occasion lately to ride into that part of *Glouecester-shire*, where the bones were found, I received a Confirmation of it from two of the Sons of the Gentleman, in whose ground, and at whose great charges, they were discoverd, the Father being dead some four years since; only with this difference, that whereas the former Relator intimated the Bone, mentioned before, to be the Ulna, or the Radius, they apprehend it rather to be to the *Os Humeri*, or Bone from the Soulder to the Elbow, which they affirmed to have been as long as from the Elbow of any ordinary man to his Fingers ends, or the length of that Bone usually and half the Ulna or Radius.

Also, that both the Sceletons were of extraordinary dimensions, but one bigger then the other, & not both in one Sepulchre or Vault, but two distinct ones, distant about a yard each from other.

The

The Vault of the greater was not above five foot long, in the form, (according to their resemblance) of a Jews-harp, narrow at the Feet, and broader about the Seat; so that this body must sit, being judged by some intelligent persons that saw it, to have been a man of nine foot in heighth. The other was longer, and the Bones supposed to lie at length, yet very little within the ground; having both great stones about and over them, in the manner of a Tomb.

After I had received their Information, they were pleas'd for my further satisfaction, to accompany me to the place, about a quarter of a mile from their house, in an Inclosure, hard by the high-way side, now made meadow ground, where I saw one Stone, which was at the entrance of the Vault of the greater Sceleton, standing in the same place it was first set, about 4 foot above the ground; to which the other Stones did Answer: so that the length being five foot, and the heighth four, confirms the Conjecture of the Stature of the Body mentioned before.

The Tomb-stone that lay over the greater person, of an uneven, and (as I may term it) mazzardy surface, was so vast and weighty, that it was a business of great difficulty and labour to remove it; of a grayish colour without, but reddish within, and in many places studded with a bright shining Stone, somewhat resembling the Stones of St. *Vincents* Rock near *Bristow*.

I cannot understand by them there were any Inscriptions, and but two or three Coins, one having a Falcon (as they called it) which might be a *Roman* Eagle; another a *Cæsars* Head, with

a wreath of Lawrel about it, supposed to be the Head of *Claudius* the Emperour.

The common report there is, that it was the Tomb of *Offa*, King of *Mercia*, who yet was one of the middle Kings of the *Saxons*, and lived neer 250 years after the *Romans* departed out of *Britain*, of whose extraordinary stature, I know no Historian that takes any notice. It seems to have been a *Golgotha*, or common place of Burial, in those times, the ground thereabouts, in a round, or rather an Oval figure, for neer half an Acre, affording great plenty of other Bones, and the place bearing the name of *Bone-hill*. The time of it's discovery was about the year 1652. Whether this great person were a *Roman*, or a *Saxon*, is not very easie to determine; if a *Roman*, 'tis much they should here, contrary to their common Custom, both preserve the Bones, and leave no Inscription; and if a *Saxon*, 'tis as different to solve the Phænomenon of the *Roman* Coins, being not accidentally found among other rubbish, but in the Sepulchre it self. However, whether *Roman*, *Saxon*, or other, which I shall not at this time any further dispute, it is enough for my present purpose that it was a body of more then ordinary dimensions, and exceeding the heighth of an ordinary man in those times by 3 foot, that is higher by the half then most men now.

2. A Foot-man with a Spear.

3. A Foot-Soldier brandishing his Sword, and bearing out his Shield.

4. Two kissing and clipping one another, which by the Crook in the right hand of one, seems

seems to be the remembrance of the kindness of a Shepherd to his Mistris.

5. A naked man laying hold of a Soldier, which may represent an insulting *Roman*, apprehending a poor, distressed, and captivated *Britain*.

6. Upon a Stone, with Letters standing overthwart, This Inscription:

This seems to have been part of the Monument of some Strumpet, ILIA, if I erre not in my conjecture, being the Reliet of IVLIA, Wife to *Septimus Severus*, of whose Lewdnes, *Ælius Spartianus* gives an account in the life of that Emperour; and ILIA to be understood of *Ilia* the Mother of *Romulus*, concerning whom (omitting *Ovid*, *Juvenal*, and others) that make mention of her Chastity) I shall content my self with the single testimony of *Horace*, who brings in *Lydia*, his Courtezan, making him this reply; *Od. lib. 3.*

Donec non alia magis
Arsisti, neque erat Lydia *post Chloen,*
Multi Lydia *nominis*
Romana vigui clarior Ilia.
Id est,
Whil'st to Thee none else was dear
And Thou to me didst not prefer,
Cloe, then I great of Name
Did outstrip the Roman Dame.

Not

Not that I conceive either of these to have died here, (though *Severus* himself did, and was buried at *York*) but some of the Sisterhood may, of later date, and might have the Superscription of more noted names. For, that they bestowed Monuments of this sort of Creatures, is evident from a Stone, taken up not long since, very opportunely, at the Bell in *Walcott*, with this short Inscription:

Here lies *Mary Vibia.*

VIBIA IVCVNDA
H. S. E.

It being by them accounted somewhat absurd, that those who had so great a name whil'st they liv'd, should be destitute of one, when dead.

Another thing that inclines me to this opinion also, is, a Hare, a venereous creature, and embleme of Lust; witness that question in the Comædian, *Tute lepus & pulpamentum quæris?* unto which these letters were formerly annexed; for in Mr. *Cambdens* time it was here running, but since this light-foot is run quite away.

7. Two Roman heads, one within the Cope of the wall, and another in the outside thereof, hard by, whereof that within the Cope of the wall, hath an ear standing up, somewhat like the ear of a horse.

8. A little higher, toward the West-gate, letters standing cross, which I place thus:

III.

III. VS. ISA.
IS. VXSC.

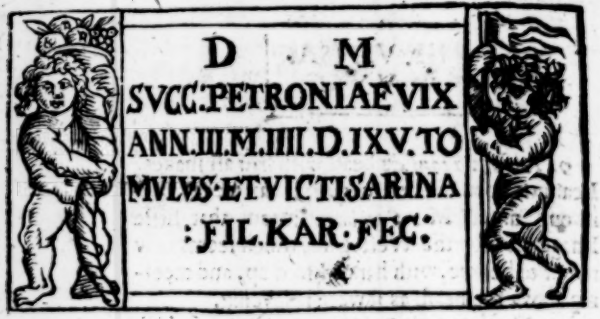
9. As for *Meduſa*'s head, with hair all ſnakes, I cannot upon the beſt enquiry I can make, find it out, unleſs Mr. *Cambden* meant that little Image cloſe by the Weſt-gate, which ſeems now rather to be one, with hands lifted up, and meeting above the head, as it were rejoycing.

10. Neither doth *Ophiucus* occur to me, which I am apt to think that learned Antiquarian, in haſte, might miſtake, for ſomething between the loving couple and the naked man, like a Roſe, with a branch about it, reſembling a Serpent.

Of thoſe of the ſecond ſort, between the Weſt and North-gates, the Firſt is part of the Graveſtone of one, whoſe name began with theſe three letters I O P. The Inſcription thus:

VRN
IOP.

2. The next is a Monument of one of the children of two Romans, *Mulus & Victiſarina*, with a longer, and exactly Roman Inſcription, in a Sepulchre Table, between two little Images, whereof the one holds the horn of *Amalthæa*, the other flouriſheth a Banner. The Inſcription which I read ſomewhat different from Mr. *Cambden*, is this: D. M.



i. e. To the dead Ghost of *Succ. Petronia*, who lived 3 years 4 moneths, and 14 daies, *Mulus & Victisarina*, in memory of their dear Child, made this. What that ƎO, at the end of the second line is, unless put for *Et mo*, and signifies *Et moritur*, I cannot at the present conjecture.

3. *Hercules* bearing his left hand aloft, with a Club in his right hand. Yet I leave it to others to judge, whether it may not something resemble one of those little Images mentioned but now.

4. The last I observe, and neerest to the North-gate, is a memorial of a Roman Senator of the Colony of *Glocester*, a City built by the Romans, who also placed there a Colony called *Colonia Glevum*. The Inscription after this manner.

Cambden, p. 360.

DEC.

DEC. COLONIAE GLEV. VIXIT AN. LXXXVI.

i. e. Decurioni Coloniæ Glevi, vixit An. 86. yet in the stone, after the figures *LXXX*. I observe a *Q*, in this sort, *LXXXQVI*. which seems not to be without some signification. If I may be allowed the liberty of a conjecture, I suppose it might be put for *quinque*, and ought to be read *LXXXQVINQ*. There being room enough for, and as it were the marks of two other letters, *N* and *Q*, and the party aged 85, not 86.

And whereas I render *Decurio* a Senator, I pitch on this signification of the word, as most proper here, of which *Rosenus* gives the reason; *Senatores in Coloniis, ut etiam in Municipiis, Decuriones vocabantur, eam ob causam, quod Pomponio* ⅂C. *auctore, decima pars eorum qui deducerentur, publici consilii gratia, sit solita conscribi.* I know *Festus* mentions another, and more usual signification of the word, to wit, an Officer over ten horse-men. *Decuriones, inquit, appellantur, quis denis equitibus præsunt*; of which, if any one please to understand it, he shall have my leave. *Ant. Rom. L. 10. c. 24.*

5. As for leaves folded in, and *Hercules* streining two snakes, I cannot be so fortunate yet, (though my search hath been particular) to light upon it.

The Antiquities in the Garden are only two Inscripti-

Inscriptions in two Grave-stones, with their Urns: The one an Epitaph of *Caius Murrius*, of the tribe called *Arniensis*, (the 25 tribe among the Romans, so called from *Arnus*, a River in *Tuscany*, as *Car. Sigonius*, and *On. Panvinius* relate; a modest pleader in the Julian Court, a Souldier of the second Legion, and continuing in pay 25 years. The Inscription as follows.

C. MURRIVS
C. F. ARNIENSIS
FORO. IVLI. MO
DESTVS. MIL
LEG. II. AD. P. F.
IVLI. SECVNDI.
AN. XXV. STIPS

H S

2. The other, an Epitaph of *Marcus Valerius*, a Latin, (for so I read, and not *Eatinus*, as Mr. *C.* a Souldier of *Augustus* his Legion (if not the xx) 35 years of age, and 20 years in pay. The true Copy thus:

DIS

DIS MANIBVS
MVALERIVS. M.
FOL. LATINVS. EQ
MITES. LEG. XX AN.
XXV. STIPEN. XX.
H. S. E.

Where it may be noted by the way, that this man had some favour to be admitted at 25 years of age, when as the usual time of listing Souldiers was not till 17. Also, whether C. EQ. be to be read, as some would have it, *Cohortis Equitum*, I somewhat doubt, the *Copiæ pedestres*, or foot, commonly among the Romans, being divided in *Cohortes, Manipulos & Centurias*, the *Equestres*, or Horse, *in Turmas & Decurias*. *Al. ab. Alex. Gen. dier. l. 3. c. 20.*

Many Roman Coins are also found in these parts, two of which I have by me, digged up at *Walcott* (whence the two last Inscriptions came) in the same house with the Inscription of *Vibia* before-mentioned. The one neer 1600 years old, being a Brass-piece of *Vespasians*, in which all the letters on the face side are decayed, except *AES. VES*, and some marks of *PAS.* on the reverse, *PIETAS AUGUSTI* (as I think) the three former letters of *Pietas* being very obscure) with an Image between S C. signifying *Senatus Consultum*. *Cat. Sizen. de Jur. Rom. l. 1. c. 15. Rosc. Ant. Rom. 1. x. c. 5.*

The

Cambden. Br. p. 72.

Caius. Carausius. Pius. Felix. Augustus.

The second, some 200 years after, bearing the name of *Carausius*, who in the time of *Diocletian* and *Maximian* Emperors, took upon him the Imperial Ensigns, and seized *Britain*. The Circumscription thus: *C. CARAVSIVS P.F. AVG.* on the other side, *PAX AVG.* and under an Image, *MLXX.* which I suppose to be the year *ab Urbe Condita*.

CHAP. V.

Of the Nature, Use, and Virtues of the *Baths*.

Baths of Bath *much of the nature of the* Thermæ Aquenses *in* Germany. *Certain Parallels between* Bath *and* Akin Bladud *in some measure vindicated.*

I Come now to speak something of the Nature, Use, and Vertues of the *Baths*. And here it cannot be expected I should say much, because my experience of them as yet hath been but little, and the Observations I have made seem fitter, (as they are intended) for a foundation to a greater work, (which time, and variety of experiments must compleat) then, at the present to be communicated to the publick. And to make some compensation for my brevity in this thing (which is justly deemed the most material of all other) I shall take the boldness to engage, as soon as time and opportunity shall permit, to make

make a through search into the cause of the Heat, Nature, and efficacious operations of the Baths, and perhaps give a more satisfactory account of the former, than yet hath been given by any; and for the later, I shall not build on the hay and stubble of the talk and relations of persons by-ass'd and concern'd, but on the solid basis of reason, observation and experience. In the mean time, as I would not seem ridiculous to some, treating too largely of what I have not yet made a clear inspection into, so I would not be accounted absurd by others, in wholly waving the principal part of my Subject.

To offer then a course bit to the eager appetite, till time shall favour us with a better treat; I conceive that the Baths of *Bath* come very neer the nature of the *Aquenses* in *Germany*, the knowledge of which may be a great help to the better understanding of our own. I shall therefore, out of the succinct, but pithy discourse of these waters, composed by the learned and Judicious Physitian *Fran. Fabritius Ruremundanus*, sometime Physitian there, take notice of some Parallels between that place and *Bath*, in which, besides many pretty remarkable Coincidences, the nature of the Countrey, and parts adjacent, is in some measure discovered.

The first is, that Histories relate, that the Hot Waters there were found out by a Prince, one *Granus*, brother, as 'tis said, to *Nero* the Roman Emperor; who first discovering these Baths, among the mountains and woods, built a Castle, and dwelt there, of which, in the Authors time, there was a monument standing, called *Turris Grani*.

Secondly, That the City was called by the name of the Waters, to wit, *Aquæ Granis*, which some improperly call *Aquisgranum*. *Ab incolis Aquæ Grani appellatæ sunt, cum Therma, tum locus ipse, deducto scil. nomine ab Aquis Calidis, & Grano repertore, manſitque appellatio poſtea & Urbi, niſi quod quidam non ſatis apte immuta inflexione, Aquisgranum appellent.* The Inhabitants saith *Ruremundanus*, call the Place, as well as the Waters, *Aquæ Grani*, by a name drawn from the Hot Waters, and *Granus* the Founder, which name afterwards the City had, but that some, not so properly, changing the termination, call it *Aquisgran*.

Thirdly, That the City is *ſita in valle, & montibus circumquaque cincta*, seated in a bottom, and encompassed about with Hills. That the Hills (besides Wood for Fire and Timber) contain Quarries of Stone for Building. That cold Springs arise within & without the City in great abundance. That at some distance off is found Lead, and a Bituminous Earth, which mine Author calls *Terra nigra, foco culinario aptiſſima*. That in the City are two Chief Bathes, The one called the *Kings*, the other the *Cornelian*. In the Suburbs, not far from the South Gate, are more Hot springs, called, from the abundance of Hogs that are there about, the *Porcetan Bathes*, which being not so powerfull as the rest, are less used. And lastly, that I may mention something that would be advantageous to both, and both do want, viz. *a Navigable River*, which saies *Rurem.* would compleat its happiness. *Nihil, inquit,*

p. 14

inquit, ad felicitatem deesse videtur, quam Navigabilis Fluvius. p. 14.

Now to give you the Counter-part of the parallel: 'Tis obvious to observe, that to the first corresponds the History of King *Bladud*, which seems not to be so fabulous, as many men imagine. For, probably, many Relations we have of persons, and things, and of those elder times, when ignorance so much prevail'd, and men had little subtilty in their actions, and less politeness in their speech, may have much of truth in them, though they now seem odd, and ridiculous to us. And I am apt to think, that many old Realities do suffer much, on no other account then their suspicious appearances, consonant then to the temper, and genius of those times. Just as 'tis reported of some old women in *Lancashire*, that they go for Witches, meerly because they look like such. Not considering, that a great deal less time then 2000 years, hath made considerable alterations, in the manners, lives, and customs of men.

And whereas King *Bladud* had the name of a Magitian, I look upon it as a greater argument of his more then ordinary learning, then note of reproach, the wisest men in those times, and long after to, being reputed such, and he recorded a wise and eloquent Philosopher, and Mathematian, accomplish't (as the times then would bear) with treasures of forrein, and domestick knowledge, having spent in Study, (as is reported) besides many, doubtless, afterwards, in his own Countrey, eleven years in his Minority, at *Athens*. Of whom that you may receive a more

particular account, I ſhall not think much to give you the Engliſh of what *J. Bale* in his Book *De Scriptoribus Anglicis*, writeth of him. *Bladud* ſurnamed the Magician, the 10th King of the *Britains*, was ſent in his Youth, to the famous City of *Athens* in *Greece*, there to be inſtructed in Philoſophy, and the Liberal Sciences. And when he had there ſtudied a certain time, hearing of the death of *Ludhudebras* his Father, he returned home again, bringing with him four expert Maſters in many Sciences, not thinking it meet that his Countrey ſhould lack any longer ſuch ſingular ornaments of Learning as they were. Theſe Philoſophers, as *Merlin* writeth, he placed at *Stamford*, in a very pleaſant Soyl, and made Schools for them, to the intent they ſhould there read the liberal Sciences, where they had many times a great Audience. He was a man very cunning and skilfull, as well in Prophane Sciences of the Gentiles, as in all Wiſdom and Knowledge that the Græcians excelled in; but eſpecially ſtudious and very well ſeen in the Mathematical Arts and Sciences, whereupon one of the Sybils, that lived in his time, wrote and dedicated unto him a Book of Propheſies. Some affirmed that the ſame *Bladud* built the City of *Bathe*, and therein made by a wonderfull Art, certain Hot Bathes, for the uſe and commodity of the people, which do yet remain to this day, committing the Conſervation thereof to the Goddeſs *Minerva*, in whoſe honour he cauſed a Temple to be there erected, to the intent, that being preferred by ſo mighty a Goddeſs, they ſhould never fail, but con-

continue for ever, they write also, how that he read and taught Necromancy throughout all his Realm. But these things I suppose are feigned matters.

To the second particular answers the Name of Bathe, taken from the Waters. For this Name, as is noted before, was given to the City, some time after its foundation, when the Hot Waters came into greater request, being called first, after the name of the Founder, *Caer Blaidin.*

To the third, agrees the situation of *Bathe*, being exactly the same. To the fourth, the Quarries of Stone, upon *Claverton Down*, *Horsecomb*, &c. To the fifth, the Springs of *Cornwall* in *Wallcot-fields*, *Beechenclift*, &c. To the sixth, *Timsbury*, *Burnet*, (and though the distance be somewhat greater) *Mendip-Hills.* To the seventh, the *Kings Bathe*, with its appendage, the *Queens* and *Cross-Bath.* To the last, the *Horse-Bath*, without the South-Gate, doth in some measure, answer, though it hath no Hot Springs of its own, but is supplyed by the Overplus of Water coming from the Kings Bath.

And whereas it is recorded, *That these Bathes are not wholsome at all hours, being from 8 of the Clock in the morning, to three in the Afternoon, Scalding Hot.* It is clear, that the inequality of the heat proceeds not so much from the Waters (which in themselves, are observed to vary very little from a constant, and equal degree of heat, both Winter, and Summer) as from the beating of the Beams of the Sun in hot weather on the Surface of them, which being more troublesom

Carbleus Br. pag. 233.

to the Bathes, and Mornings and Evenings more convenient for Bathing, the middle part of the day is not made use of, though the Waters then are as wholsome as ever. But we may well pardon this learned and industrious person, if he hath not in this, and some other particulars, done the Bathes right, in regard the vastness of his designe, and urgency of his occasions, might hasten him hence, so that, haply, he could not throughly inform himself in things of this Nature.

To conclude this Chapter, I shall mention some parts of the description of that City, mentioned before, in the Authors own words, and compare them with what Description Dr. *Venner* hath given of this of *Bathe*. *Aquæ Grani appellatæ sunt ab incolis, cum Thermæ, tum locus ipse, deducto scilicet nomine ab Aquis Calidis &c. Hæc urbs tametsi in valle sita, & montibus circumquaque septa sit, incredibili tamen gaudet aeris salubritate. In proximo urbis ambitu lata fere planities est, in qua & pascua sunt, alendo pecori commodissima, & agri pingues. Nec desunt fontes, tam feris pascua irrigantes, quam intus diversis urbis locis, publice in plateis scaturientes. Ad Orientem Rhenum, ad occidentem habet Mosam. Sed alias dotes omnes, meo quidem judicio, vincunt Aquarum Calidarum uberrimi simul ac Saluberrimi fontes.* The words of Dr. *Venner*, as neer the English of the former as may be, are these. *Bathe*, so called from the Bathes in it, is a little, well compacted City, &c. Although the site thereof, by reason of the Vicinity of Hills, may to some seem not pleasant,

Rurewund. De Baln. Aq. p. 11. 12. &c.

Trio Bath. 1.

pleasant, being almost environed with them, yet for goodness of Air, neerness of great and delectable Rivers, pleasant Meadows, and plenty of excellent Water, brought down from the adjacent Hills into the Streets, it is pleasant, and happy enough; But for the Hot Waters that boyl up even in the midst thereof, is more delectable, and happier then any other of the Kingdom.

CHAP. VI.

Of the Bathes in particular here.

Of the three Hotter Bathes, viz. The Kings, Queens, and Hot Bathe. But chiefly of the Kings, and in what Diſtempers Bathing therein is profitable.

HAving thus far drawn the Parallel between *Bathe* and *Akin*, which, as they cannot be conceived to agree in every punctilio, (no Compariſon, as they ſay, running on four feet) ſo it ſeems they cannot correſpond in ſome of thoſe particulars before recited, without a Communication alſo in the Waters of many of the ſame Medicinal Vertues. Having done this, I proceed to a light guſt and reliſh, of the Vertues, and uſefulneſs of every Bath in particular.

And here taking it for granted, till better information, what the very learned and incomparable Doctor *Forden* hath obſerved, That there is very little difference in the Nature of the Bathes of *Bathe*, but in the degree of heat, they all proceeding from the ſame Mine, which according to the intenſeneſs or remiſsneſs of its heat in divers parts, and the directneſs or indirectneſs of the paſſages from it, may cauſe this Variation; and alſo, that the Minerals impregnating the Bathes in general, are Bitumen, Nitre, and Sulphur, I ſhall run the Parallel a little further, and ſpeak ſomething in particular of all the Bathes; and firſt of the Kings.

The *Kings Bathe* exceeds the reſt in Heat and

and Dimenſions, being the hotteſt, and largeſt of all. And whereas there is another that for ſome time hath, I know not how, appropriated the name that is common to them all, and therefore gives moſt people occaſion to imagine the heat to be more intenſe there then any where elſe, I conceive, at preſent, the heat of that Bath, to come as much ſhort of that of the Kings, as the Croſs Bath, in that inſtance, yields to the Queens.

This Bath, as to its vertues, much reſembles the Kings Bath at *Akin*, that is, conſiſts of the ſame Minerals, though probably, not in the ſame proportion; the German Kings Bath being accounted chiefly Sulphurous; This of Bath, Bituminous. Which, yet notwithſtanding conſidering the great affinity Bitumen hath with Sulphur, and the ſlender difference in their qualities, being both ſuppoſed moderately hot and dry, and therefore muſt both (according to the common notion) attract, reſolve, mollifie, and diſcuſs, will not alter much the Caſe, not to mention that *Baccius* and *Bauhinus*, and (what is more natural) two of our own Countreymen, Doctor *Turner*, and Doctor *Venner*, do all agree, That they are chiefly Sulphurous. And whereas *Rurem.* ſaith of the Kings Bath at *Akin*; *Refert hæc aqua modis omnibus naturam Sulphuris, cum admiſtione Nitri modici*; making mention of Sulphur and Nitre, but omitting Bitumen, I queſtion not, but upon Examination, it would be found that Bitumen alſo was concern'd in that Bath, as well as the Cornelian in the ſame City. And the Catalogue of Diſeaſes, for which

De Baln. Aq. p. 18.

which this *Bath* is profitable, ſuggeſts as much: bitumminous waters being of a heating, drying nature, and ſuppling the nerves.

The Encomium he gives of this *Bath*, and the Diſeaſes he affirms it to do good in, (which for the moſt part agree to this of *Bath* alſo) are as follows. This *Bath* is profitable for many diſtempers, eſpecially cold and moiſt: for it heats powerfully, dries, drives the humors from the inward parts to the outward, diſcuſſes, attenuates, abſtergeth, and that I may ſpeak more particularly, good chiefly in affections of the Nerves, as Convulſions, Palſies, as well alone, as accompanying an Apoplexie, in defect of ſenſe or motion, or both. It helps ſtiff, benumm'd, and trembling limbs, does good in the ſeveral ſorts of Gouts, eſpecially Hip and Hand-gout. Diſcuſſeth Tumors: Relieveth thoſe that are ſtreightened about the Midriff: thoſe that have a Cachexy, or ill habit of body: The Dropſie (eſpecially the Anaſarca) and Jaundice. Thoſe that are troubled with a cold diſtemper of the Stomach, Liver or Spleen. Excites and reſtores Appetite. Eaſeth pains in the ſides (without a favour) Bowels or Loins. Helps cold and moiſt diſtempers of the Womb; furthers Conception, provokes the Terms, giveth eaſe in uterine pains; takes off wearineſs as well ſpontaneous, as by exceſſive labour and travel, &c. moſt proper for thoſe of a cold Conſtitution, and ſomewhat corpulent, and not ſo convenient for dry and entenuated perſons. To which may be added Lethargies, Epilepſies, Cramps, Deafneſs, Forgetfulneſs, Aches, and many others of the like nature,

ture, with the Scorbute, (provided the body be duly prepar'd before, and the *μιάσμα* in that diſtemper well corrected) and the extremity of the pains of the Spleen.

The Hot Bath is ſomewhat cooler, and profitable in the like caſes; and Dr. *Venner* hath obſerved moſt efficacious for any weakned and relaxed limb.

The Queens Bath is the next for heat, and hath the ſame virtues with the Kings, out of which it was taken, having no hot ſprings of its own, but is ſupplyed out of the Kings, where the water ſtanding as it were in a Cooler, is made more temperate, and fitter for tender bodies, that cannot well endure ſuch a degree of heat, as in the Kings Bath.

CHAP.

CHAP. VII.

Of the Cross Bath, and its Virtues.

THE *Cross Bath*, as to its degree of Heat, abating somewhat of the Queens, is the coolest of all, of which I may say, as a stranger sometime did of this City, that it is *E minimis pulcherrimum*, and though it be little, is not on that, nor any other account despicable; *Ineſt ſua gratia parvis.*

Cap. 17. This *Bath* is thought by Dr. *Jorden* to participate more of Nitre than the rest, and therefore is observed to supple & mollifie somewhat more, receiving a greater degree of cleansing and penetrating from the Nitre; Consonant to which 'tis said of the *Cornelian Bath* in *Akin.* *Aqua hujus Balnei ſulphurea quidem eſt, ſed ſalis non parum habet admiſtum, quin & bituminis nonnihil in eſſe certis indiciis deprehenditur; Quo fit ut hæc aliquanto valentiore ſit exiccandi, extennandiq; potiſſimum facultate, quam aliæ, diſcutit, abſtergit, ac mollit, i. e.* The water of this Bath is indeed sulphurous, but hath a considerable quantity of salt mixed with it, and some Bitumen; wherefore this hath a more powerful drying, and attenuating faculty than the rest, discusses, cleanses, and mollifies.

Rurem. de Bal. Aq. p. 21.

And whereas instead of Nitre, he mentions Salt, the difference, though something I confess, cannot be great, since many of the same vertues are both by him and others attributed to saline Waters, as Nitrous; Nitre it self being a kind of Salt. From the mixture of the Sulphur and Bitu-

Therme Nitroſe omnino eaſdem facultates habent, quas Salſæ, &c.

Bitumen, it heats, diſcuſſes, and ſupples; from the Nitre, it receives an addition of cleanſing, and penetrating. *Fuch. Inſt. Med. lib. 2. S. 5. c. 28.*

This Bath then muſt be of Excellent Uſe in all Contractions, Indurations, and Reſolutions of nervous parts, diſperſe, and diſſipate cold Tumors; relieve Cachectick, Hydropick, and Corpulent perſons; oppoſe the Sciatica, Cramps, Convulſions, Defluxions, Barrenneſs, and the Whites in Women; uſefull in Cutaneous Diſtempers; as the Itch, Scabs, Morphew, and Leproſie. Good for fleſhy, cold, moiſt bodies; and not ſo proper for hot, and dry Conſtitutions.

And here I muſt crave leave to add, that the reaſon I conceive why the Croſs Bath comes not up to the heat of the reſt, is partly on the account of its being ſerved by four Springs, but chiefly proceeds from the greater proportion of Nitre it contains, which being of a cooling nature, may more allay the heat ariſing from the Sulphur and Bitumen there, then in the other Bathes. And that Nitre doth more abound in that Bath, then in the reſt, may probably be collected, as from other reaſons, which I here forbear to mention, ſo partly from this, that it ſooner penetrates the body, and hath an eaſier, and quicker ingreſs into its paſſages and pores, to the great relief of ſome, though it ſeems Paradoxical, in Nephritick Diſtempers.

But I hope I may be excuſed on the Score of my former Engagement, if I am not more particular at this time, in things of this nature, till a juſt amaſsment of Obſervations and Experiments,

riments, and a rational deduction of Conclusions from them, (which I hope in some time to accomplish) shall either confirm me in the opinion I now have of the Nature and Vertues of the Baths of *Bathe*, or supply me with a better.

Atq; hæc Hactenus.

FINIS.

Sphalmata Typographica.

PRef. Page 1. Line 14. Read *review*. l. 16. r. *quasking*. p.4.l.15. for only, r. *with*. p. 5. l. 27. for the fig, 48. r.57. p.11. l.9.r. *from the Place*.

Epist. Ded.

Page 3. in the marg. against *Galba*, insert *Ingenium Galbæ male habitat*.

Appendix.

Page 4 in margent, for Huneſey, r. Hunes. p.5.in marg. r. *Manlius*.p.7. l.7.r. *fawningly*. p.8.l.7.r. *names in*.l.10. for is, r.are.l.31.blot out to. p.9.l.29.r. me to th. p.14.r. *Marius*. p.16.l.1 .long ſiege.p.19. l. 16.r.*printed*.p. 21.l. 12. for of, r. *N*. l. r. a man that pr.p.26.l. 5. for *Burkeley*,r. *Burghley*.p.28.l.9.r. *Factis*,l.20.r.*limina*.p.29.l.17.r.*Rodb*.l. 20.r. *urbem*.l.22.r *regalis*. l. ult.r. *pteromata*. p. 30.l. 2. r. *longas*.l.11.r. *fanis*. l.16. r. *proſtant*. p.31.l. 2.r. *ſuorum*.l.3. r. *lampade*.p.33.l.5.r. *miræ*.l.9. r.*fuſor*. l.14.r.votis. l.18.r. *præducente*. l. 19. r.*Cantica*.p. 34.l.1.r.*diu*.p.39.l.13.r.*Septimius*. p.40. in marg. r.*Herr Vib*.p.43.l.23.r.*qui*.for Roſe, Roſin.p.48. l. 2.r. *Grani*. l. 8. r. *immatat*.p. 50.l.33.r. preſerved.p.55.l.23.r.*material*. p. 56. l.15. r. *ſeveur*. l. 31. r. *Extun*.